DENMARK

SELECTED ISSUES

June 2022

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DENMARK

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CURRENT ACCOUNT SURPLUS IN DENMARK

Denmark's current account (CA) surplus remains large and persistent—mainly driven by surpluses in trade and primary balances. When assessed from a saving-investment (S-I) gap perspective, the CA surplus is mainly accounted by the corporate sector and not households. While Denmark's overall savings rate is high, household savings and pension contribution rates—despite supporting generous pension replacement rates—are on the lower end in international comparison. The Danish tax system does not appear to be a major driver of its CA surplus. The relative scarcity of Danish bonds may have contributed to the rising primary income surplus. Thus, deepening local (non-real estate) debt markets, could potentially reduce the primary income surplus. Finally. policies that boost investment would help close the S-I gaps and bring down the CA surplus.

A. Introduction

1.   Denmark's current account surplus remains large and persistent. The current account (CA) balance has increased on a sustained basis since the global financial crisis (GFC), averaging more than 8 percent in the last five years, and larger than in many peer countries. This has been mainly driven by surpluses in the trade balance—in particular, offshore trade (i.e., merchanting and processing)—and the primary income balance.[1]

A sustained increase in Denmark's CA surplus since the GFC, which is now larger than many peer countries...
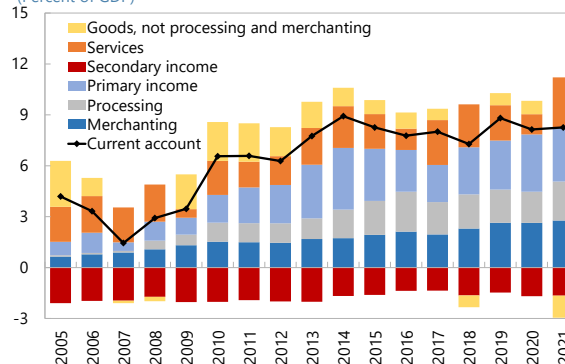
Current Account
(Percent of GDP; 2021)
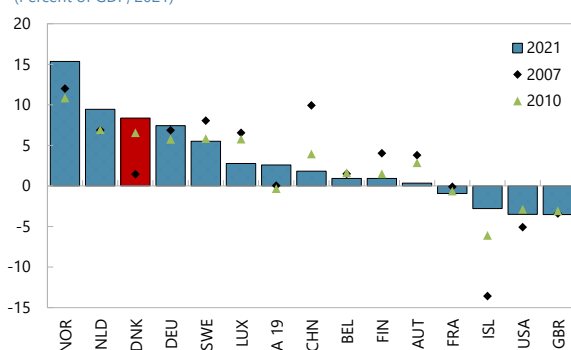
Source: IMF, World Economic Outlook database.

...driven by the trade and primary balances.

Current Account
(Percent of GDP)

Sources: Statistics Denmark; and IMF staff calculations.

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[1] Merchanting trade refers to Danish firms' purchases and resales of goods abroad without processing, which may cover intercompany transactions such as sales of goods between parent and subsidiary firms. Processing trade is similar to merchanting, but goods are procured and processed abroad before being sold. The secondary income balance, which reflects cash or in-kind transfers, remained broadly unchanged, averaging -1.8 percent of GDP since 2005. Since the secondary income has been broadly constant over time, it is not subject of this analysis.

2. **Understanding the drivers of Denmark's current account surplus and the impact of policy on such drivers is relevant.** Persistent surpluses may be justified by fundamentals. Nonetheless, there can be underlying market failures—e.g., mispricing of risks for investment, lack of capital markets—or policy settings—e.g., taxation for savings and investment—that constrain domestic demand and investment opportunities.[2] In that sense, a large and persistent CA surplus may be suboptimal from the standpoint of the domestic economy (national perspective). The issue is also related to multilateral/regional rebalancing (international perspective)—this is the major theme in the IMF's external sector assessment (see ESA Annex III in IMF 2022). Therefore, understanding the underlying drivers of Denmark's persistent current account surplus and the policy implications is an important issue.

3. **This paper undertakes a systematic analysis of these issues from Denmark's national perspective.** The key questions explored are:

- How have the components of Denmark's CA changed over time? How has the saving-investment gap evolved?

- How large are measurement biases related to inflation and retained earnings?

- What role does the primary income balance play?

- Is the Danish tax system a major driver of the current account surplus?

- What policy measures can help reduce the CA surplus? Are they desirable?

4. **The main analytical findings are as follows.** Denmark's current account (CA) surplus remains large and persistent—mainly driven by surpluses in trade and primary balances. When assessed from a saving-investment (S-I) gap perspective, the CA surplus is mainly accounted by the corporate sector while households' S-I gaps are relatively small. Mismeasurement biases are small relative to Denmark's large CA surplus. Overall, there is no clear evidence that the Danish taxation system is a major driver of the CA surplus. The relative scarcity of Danish government bonds may have suppressed their yields, thereby incentivizing Danish investors to invest abroad and, in turn, increasing corresponding primary income flows.

5. **Policies aimed at raising investment would help reduce Denmark's current account surplus.** Boosting investment is desirable given Denmark's structural needs—notably, related to climate initiatives (see Investment Section in IMF 2022). This is also key for raising potential growth given constraints on labor supply brought on by adverse demographics. While the Danish taxation system, overall, does not seem to be a major driver of saving-investment gaps, specific tax policies could be considered to boost investment, including capital income tax reforms in the areas of dividend taxation, losses carried forward, and allowance for corporate equity. A prompt decision on carbon pricing—in the context of the current Green Tax Reform—would catalyze private investment.

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[2] See, for instance, European Commission (2012) for a discussion.

Deepening local debt markets and debt-financed (green) investments may add benefit of changing relative risk premia making Danish investments relatively more attractive, potentially reducing the primary income surplus.

B. Stylized Facts

6.   We assess the current account from two perspectives. First, we look at its components—trade balance, primary income, and secondary income. Second, we look at the saving-investment gaps attributed to households, corporates, and the government.

B.1. Components of the Current Account

Trade Balance

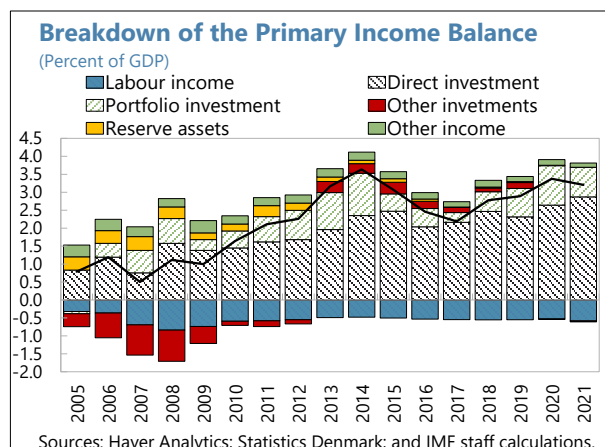**7.   Surplus in the trade balance—in particular, offshore trade—has contributed significantly to the rise in Denmark's CA surplus.** Danish net exports of goods make up most of the trade balance (about 65 percent on average in the past 5 years) with services accounting for the remainder. Importantly, in the last decade, an increasing share of exports is produced outside Denmark (5.1 percent of GDP in 2021 from less than 1 percent fifteen years ago). This can be explained by the growing integration of Danish firms in global value chains and the activities of large Danish multinational corporations in merchanting and processing trades.[3]

Trade Balance
(Percent of GDP)

Sources: Statistics Denmark; and IMF staff calculations.

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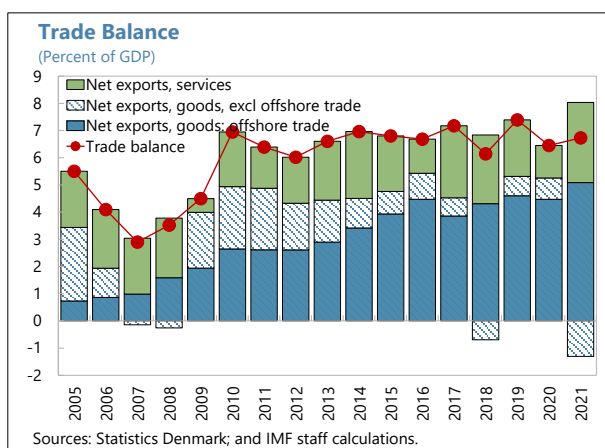
[3] Whether trade takes place across or outside a country's borders has very different consequences for domestic demand. Earnings from an increase in traditional exports would normally be distributed among domestic agents, who would use them for domestic consumption or investment. The initial impact on net exports is largely offset by an increase in domestic demand (including import demand). Earnings from outside-border trading, however, are more likely to be re-invested abroad and tend to raise national savings without increasing domestic investment. Moreover, merchanting trade activities by nonresidents are typically not deducted from the host country's trade statistics. Data limitations and lack of disclosures complicate the estimation of their effect on the current account. This creates substantial measurement issues in the trade balance. Indeed, analysis by the Danmarks Nationalbank (Kramp et al. 2018) suggests that offshore trading activities may lead to a slight overestimation of the current account surplus.
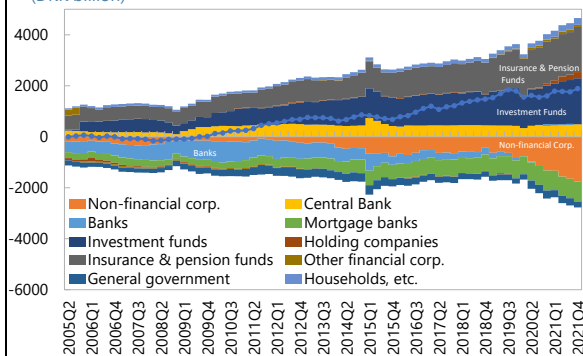
Primary Income

8.   The primary income balance has increasingly been contributing to the overall CA surplus since the early 2000s. Growing from about ¾ percent of GDP in 2005 to about 3¼ percent in 2021, the primary income balance is another main driver behind Denmark's large CA surplus. The largest contributor to the primary income balance has been direct investment income. This might be related to some large corporates finding it easier to undertake FDI and production abroad (see also ¶16). However, portfolio investment income flows have also started playing a larger role since around 2010. Labor income contributed negatively over the same period, but with a relatively small magnitude.[4]

Breakdown of the Primary Income Balance
(Percent of GDP)

Sources: Haver Analytics; Statistics Denmark; and IMF staff calculations.

9.   The positive income flows are generated by large and growing foreign asset holdings of non-bank financial corporations (NBFCs). The overall net international investment position (NIIP) grew from about DKK 3.2 billion in 2005 to close to DKK 1,888 billion at end-2021. The negative NIIPs of non-financial corporations and mortgage banks has been more than offset by the large and growing NIIPs of Insurance, Pension and Investment Funds. The holdings of the NBFCs increasingly comprise positions in private non-financial and financial corporates abroad.

The NIIP has been increasing, driven by large and growing foreign asset positions of NBFCs....

Denmark: NIIP Creditors and Debtors by Sector
(DKK billion)

Sources: Statistics Denmark; and IMF staff calculations.

...whose holdings largely comprise positions in private non-financial and financial corporates.

Pension Fund Foreign Asset Holdings
(Share)

Sources: Danmarks Nationalbank

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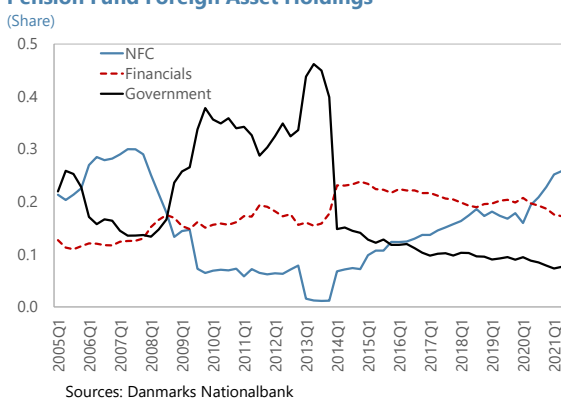
[4] The secondary income deficit has remained relatively constant over time. Since it is not driving the change in the current account, it is not explored in further detail in this analysis.
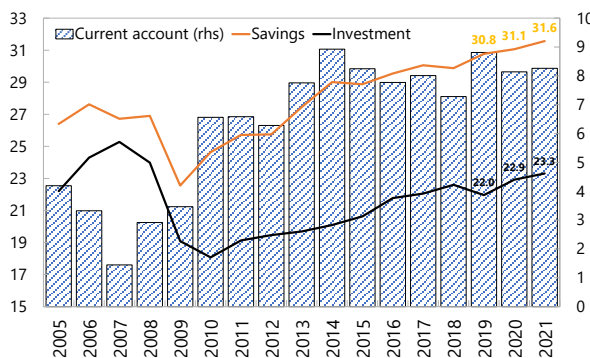
B.2. Saving-Investment Gap

10.   Denmark's CA surpluses across time are mirrored in persistent saving-investment (S-I) gaps. After dipping during the GFC, saving and investment rates in Denmark have increased.[5, 6] But the increase in the savings rate—mainly by financial and non-financial firms—has outpaced that of investment. Relative to peer countries, the overall savings rate is high while the investment rate is around the average.

The surplus reflects a persistent saving-investment gap...

External Balance, Savings and Investment
(Percent of GDP)

Sources: Statistics Denmark; and IMF staff calculations.

...mainly due to non-financial and financial firms, while the gap of households turned positive more recently.

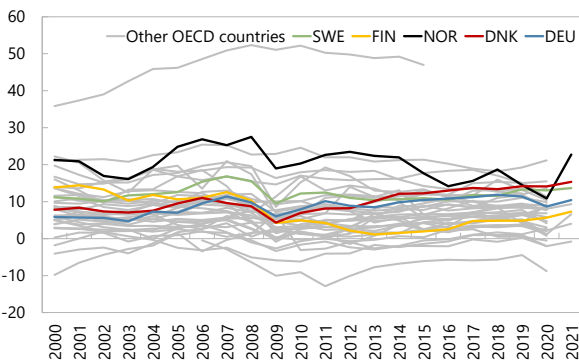**Saving - Investment Balances by Sector**
(Percent of GDP)

Sources: Statistics Denmark; and IMF staff calculations.

The steady increase in savings since the GFC surpassed many peers.
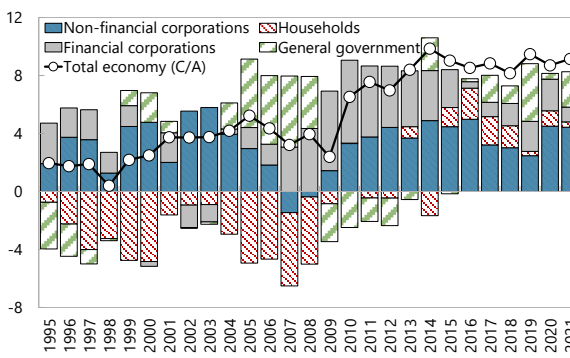
Saving Rate
(Percent of GDP)

Source: OECD.

Investment dropped substantially following the GFC though it now is in line with peer countries.

Total Investment
(Percent of GDP)
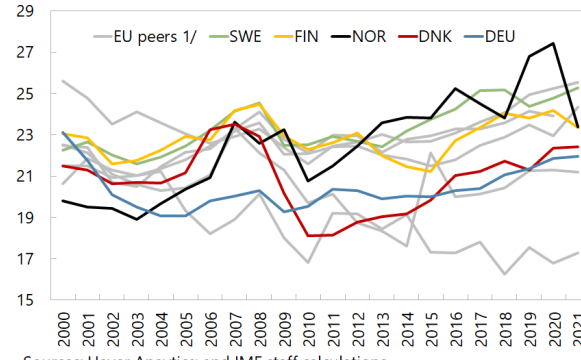
Sources: Haver Anaytics; and IMF staff calculations.
1/ EU peers are AUT, BEL, FRA, LUX, and NLD.

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[5] Throughout the paper, unless otherwise specified, saving and investment are analyzed as share of GDP (saving and investment rates). Such a normalization also facilitates international comparison. Since the current account is a flow concept, saving refers to flows.

[6] Both national saving and investment rates have been steadily increasing since the mid-90s. The trend was interrupted by the GFC, when both savings and investment fell by more than 5 percentage points of GDP due to a combination of sharply-lower household and corporate income, efforts to smooth consumption, and higher public spending.

Households

11.   After the GFC, households S-I gap turned neutral and more recently, positive mainly due to lower investments in housing and not because of lower saving rates.

- *Saving steadily increased.* In 2006 the government implemented a substantial pension reform. Under the "Welfare Agreement" the authorities extended early and public pension age by 2 years and indexed statutory retirement age to mean life expectancy (Article IV 2006). The DN finds that several factors could have caused the increase in household saving: (i) higher saving to reduce debt in the wake of the GFC, (ii) gains from low interest expenses are saved rather than spend as they are seen as temporary, and (iii) positive net pension contributions increased household savings (DN 2017).[7]

- *Investments remained lower after the GFC.* This is mainly accounted by subdued real estate investments given the housing market exuberance prior to the GFC and the sharp decline in prices shortly thereafter.[8]

12.   But household S-I gaps are small and do not seem to reflect policy distortions.

- *Denmark's households' savings rate is low relative to peers.* Although an empirical study (Papageorgiou 2017) finds Danish households save more than implied by fundamentals, such "excess savings" are small relative to other peer countries, where excess households' savings are clearly driving the S-I gap (e.g. Sweden).

- *Pension savings are supporting the transition to a fully-funded system*, with projected replacement rates that are one of the highest among the OECD countries (see Annex I for details). Still, in international comparison, the effective pension contribution rate in Denmark is on the lower end.[9] Furthermore, pension-related savings are expected to stabilize and outpaced by pension contributions, as the pension system matures (around the 2040s).

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[7] Garcia-Miralles and Laganza (2021) find large increases in contributions to retirement savings accounts—both personal plans and employer sponsored plans—during periods of policy-induced extended employment (associated with the Danish retirement system announced in 2011 and implemented in 2014).

[8] The positive household S-I gap is also appropriate from a financial stability point of view—where Danish households liabilities, which are one of the highest in the world, continue to be one of the main sources of risk.

[9] The effective contribution rate refers to contributions paid (after adjusting for floors and ceilings) as share of total wages for an average earner. All public employees and ¾ of private employees are covered by quasi-mandatory second-pillar pension schemes. As such, while the rate might be smaller the base is among the largest internationally.

Following the GFC, households' investments (mainly in real estate) plunged while savings steadily increased.

Saving and Investment: Households
(Percent of GDP)

Sources: Statistics Denmark; and IMF staff calculations.

The gross savings rate of households is low in international comparison….

Household Gross Saving Rates 1/
(Percent, 2020 or latest available)

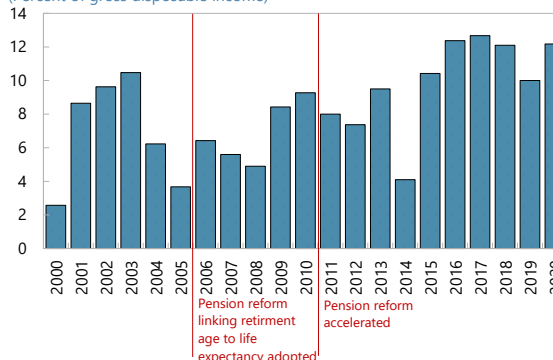Sources: Eurostat
1/ Gross saving rate = Gross saving/(Disposable income + Change in net equity of pension fund reserves). Gross saving are derived as disposible income minus expenditures. Disposible income is based on GDP at market prices using the income approach.

Danes save more than implied by fundamentals, but such "excess savings" are low compared to some peers.

Excess Household Gross Savings 1/
(Percent of gross disposable income; average 2011-16)
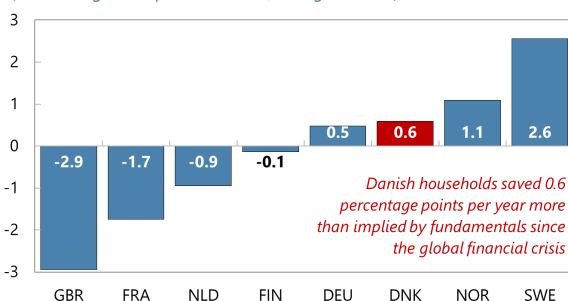
Danish households saved 0.6 percentage points per year more than implied by fundamentals since the global financial crisis

Sources: Papageorgiou, E. (2017). "High Household Savings in Sweden." IMF Selected Issues Paper, Eurostat; OECD; national authorities; and IMF staff calculations.
1/ Residuals of fixed-effect panel model by country.

In 2006 a major pension reform was announced which linked the statutory retirement age to life-expectancy.

Denmark: Gross Household Savings Rate
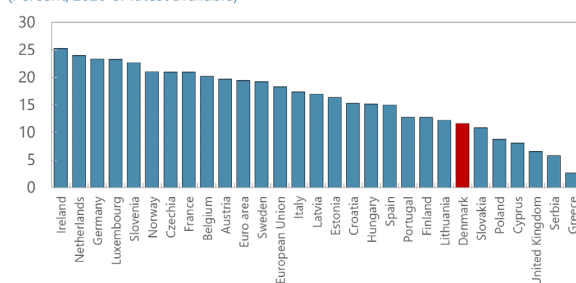(Percent of gross disposable income)

Source: Haver Analytics; and Statistics Denmark.

…as well as the effective pensions contribution rate.

Effective contribution rates (average wage earner)
(Percent)

Source: OECD: Pensions at a Glance 2021.

Around the 2040s, pension payouts would surpass pension contributions.

Denmark Pension Contributions and Payments Projection
(Percent)
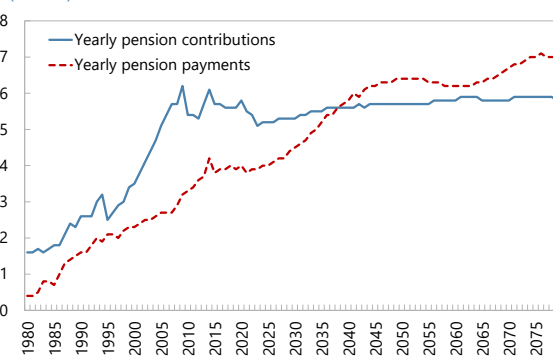
Source: National Authority.

Corporates

13.   Following the GFC, increased savings by banks have been the main driver behind Denmark's saving-investment gap. Banks increased their savings substantially after 2006 while investment generally stayed flat. Higher savings were likely driven by deleveraging efforts and capital build-up following the GFC, which was appropriate from a financial stability perspective.

14.   Saving-investment gaps in non-financial corporates remained relatively steady at a high rate. Before the GFC, corporates S-I gap was averaging 3.6 percent of GDP (1997–2006). It dipped during the GFC but returned to an average of 3.7 percent of GDP thereafter (2009–21).

Increases in financial sector savings following the GFC, likely due to banks deleveraging, drove up the S-I gap.

Saving - Investment: Financial Corporations
(DKK billion)

Pension funds
Captive financial institutions & money lenders
Other financial intermediaries 1/
Deposit-taking corporations & money market funds 2/
Saving
Insurance corporations
Financial auxiliaries
Non-MMF investment funds
The central bank
Investment

Source: Statistics Denmark.
1/ Except insurance corporations and pension funds. 2/ Except the central bank.

Meanwhile, non-financial corporates kept their S-I gap relatively steady.
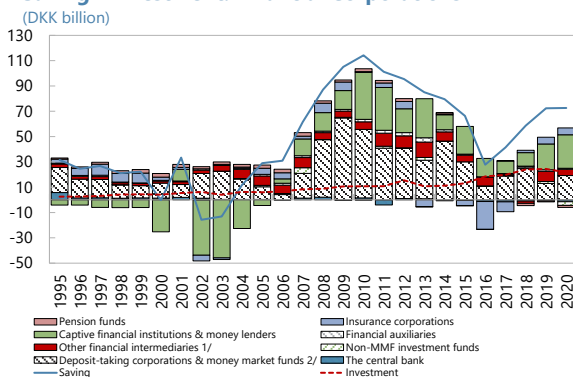
Saving and Investment: Non-Financial Corporations
(Percent of GDP)

Saving-Investment
Saving
Investment
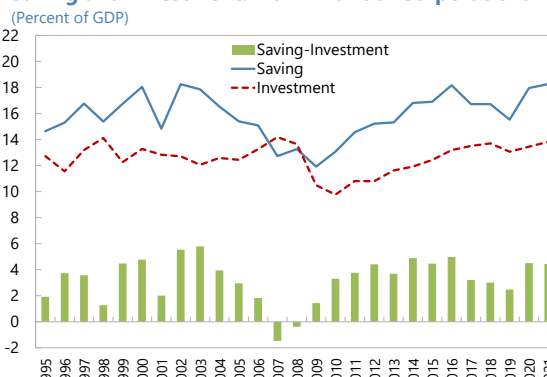
Sources: Statistics Denmark; and IMF staff calculations.

Despite using savings to make direct investments abroad, most firms are equity portfolio debtors suggesting a multinational corporate structure.

Non-Financial Corporations NIIP by Item
(DKK billion)

Direct investments
Portfolio: equity
Portfolio: investment funds
Portfolio: bonds
Other investments
Total net IIP
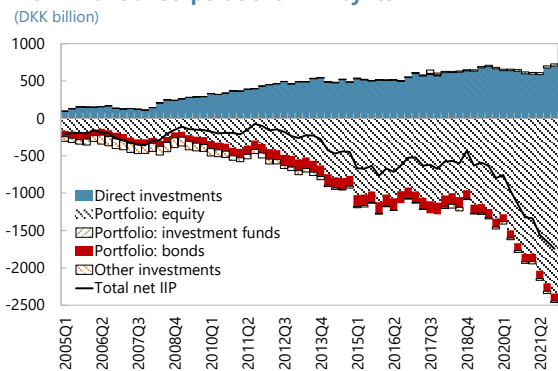
Source: Statistics Denmark.

Indeed, Statistics Denmark finds that just a few "industrial groups" explain almost half of its Balance of Payments.

The Industrial Sector's Total Contribution to the Balance of Payments, by Number of Groups
(DKK billion; 2018)
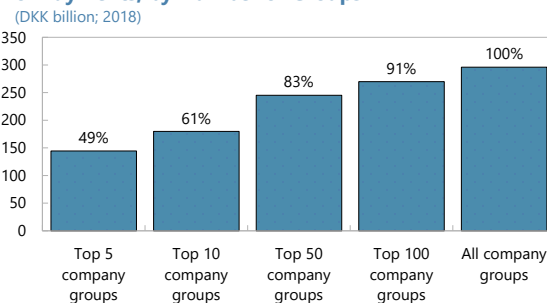
Sources: Christensen, Wederkinck, Bo, and Burman, (2020), "Few industrial groups contribute massively to Denmark's balance of payments surplus"; and Statistics Denmark Analysis.

15.   A few multinational corporations seem to be driving Denmark's CA surplus. The top five companies account for as much as half of Denmark's Balance of Payments in 2018 (Christensen and others 2020).[10] These companies may have a role in explaining Denmark's current account surplus. The underlying drivers, however, remain unclear without detailed data. On one hand, this could be related to actual optimization strategies that impact these companies' saving and investment patterns (possibly reflected in large merchanting and processing).[11] On the other hand, this could be due to measurement errors or policy distortions that discourage investments, incentivize savings, or both. Understanding the drivers—and discriminating these possible explanations—is an important agenda for future research.

16.   There may be a link between large corporate savings, wealth inequality, and the current account surplus. An analysis of the large savings of German corporates (that are mostly privately-owned) finds a link to wealth inequality (Dao 2020).[12] Similar dynamics could also be at play in Denmark, as wealth inequality (but not income inequality) appears high relative to other countries. However, this link cannot be confirmed for Denmark 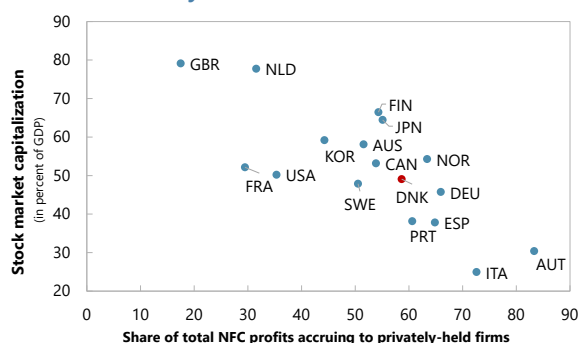as it would require additional analyses on company ownership and wealth; but it could be usefully explored in future work.

In Denmark, close to 60 percent of corporate assets and profits are generated by firms in private ownership.

Role of Privately-Held Firms, 2012

Sources: Dao, M. "Wealth Inequality and Private Savings: The Case of Germany", IMF Working Paper (2020), HFCS 2nd wave, OECD National Accounts, Thomson Reuters, Bloomberg, Federal Reserve Bank of St. Louis.

Wealth inequality in Denmark is on the higher side relative to other countries.

Wealth Share of Top 1 Percent
(in percent, 2019 or latest available)
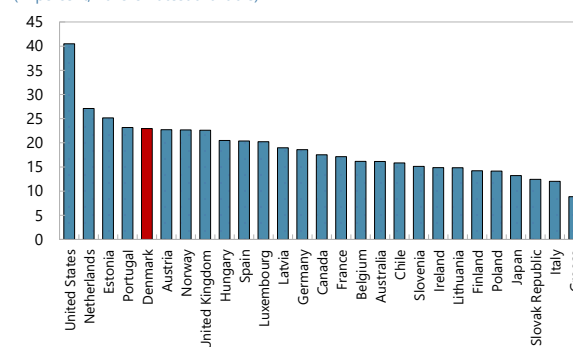
Sources: OECD.

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[10] A country's Balance of Payments (BOP) consists of two components: (i) the current account; and (ii) the capital and financial account. The current account equals the capital and financial account plus a balancing item (i.e., "net errors and omissions").

[11] While corporates used their savings to invest in FDI, reflected in large merchanting and processing (see Trade Balance Section), they are net debtors to foreigners in terms of portfolio equity from a Net International Investment Position (NIIP) view. This suggest that these non-financial corporates could be mostly multinational corporations (MNCs). However, more data on the ownership structure and savings behavior of corporates is necessary to confirm this.

[12] Dao (2020) finds that large profits of privately held corporates in Germany which mostly retained these profits (i.e., saved them) have led to increases in wealth inequality. Since these corporates are family-owned, the average German household did not have the chance to participate in the wealth increase through the stock market and on the other hand had lower disposable income because of wage restraints due to competitiveness concerns (as suggested by Germany's large CA surplus). Meanwhile, these family business households that already belonged to the top percentile bracket got wealthier thereby increasing inequality.

C. Measurement Biases

17.   Current account measurement issues could arise because of differences between the statistical definition of income and the relevant economic concept. Two forms of definitional differences are particularly relevant for the measurement of the current account balance (Adler et al. 2019). First, the inflation bias arises due to income recorded in nominal terms while erosion in the real value of debt is not recorded as income. Second, the portfolio equity retained earnings bias arises due to retained earnings on equity not being recorded in the income balance unlike dividends on portfolio equity.
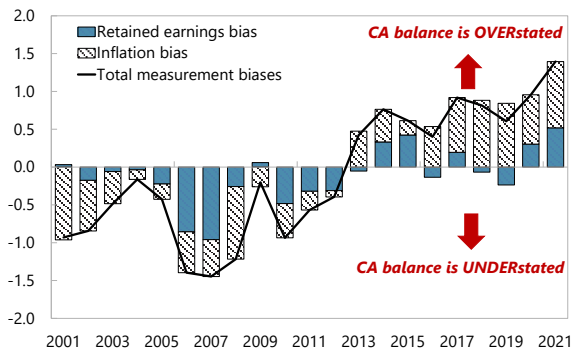
18.   The estimated measurement biases are small relative to Denmark's large CA surplus, suggesting that the surplus is overstated by 0.6–1.4 percentage points of GDP over the last 5 years. Measurement biases have been trending upwards since the early 2000s, and have switched from CA understatement up to 2012, to CA overstatement thereafter (see Annex II for technical details). In particular:

- *Inflation bias* is quantitatively the main measurement bias for Denmark's CA balance, and accounts for most of the upward trend. The increase in the inflation bias over time can be traced to shifts in the NFA level and composition, especially (i) a shift from net debtor to net creditor of other investment (bank loans); (ii) some slight reduction in Denmark's net debtor position on portfolio debt; and (iii) Denmark's FX reserve assets and positive net FDI debt position.

- *Portfolio equity retained earnings bias* is quantitatively smaller and with no clear trend. Staff deploy three alternative approaches relying on specific assumptions, and (in the absence of more granular data) inference is made using the average of the estimates form three approaches (Annex II).[13] While all three approaches lead to similar evolutions over time (similar peaks, in 2014–15 and 2020–21, and trough in 2006–07), they show some discrepancies on the level of the bias. On one hand, the stock approach generally points to CA balance understatement, consistent with Denmark's position as a net creditor on portfolio equity (implying more missing income credits than debits). On the other hand, the corporate saving approach points to CA balance overstatement over the past decade, given high corporate saving in Denmark. Further analysis using more granular data would be helpful in addressing this discrepancy.

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[13] The stock approach implicitly assumes that domestic financial market data is representative of multinational companies' behavior. The corporate saving approach neglects firm heterogeneity (e.g. SMEs vs. MNCs) in ownership ratios and saving behavior.

Denmark's CA surplus may have been overstated by 0.6-1.4 percentage points of GDP over the last 5 years....

Overall Measurement Biases
(Percent of GDP)

Sources: National Authority; Statistics Denmark; and IMF staff calculations.

.... the increase in the inflation bias can be traced to shifts in the NFA level and composition.

NFA Composition
(Percent of GDP)
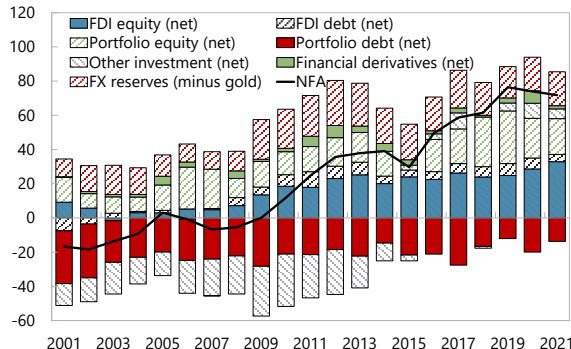
Sources: IMF, International Financial Statistics database; and IMF staff calculations.

The inflation bias is quantitatively the main measurement bias.

Inflation Bias
(Percent of GDP)

Sources: National Authority; Statistics Denmark; and IMF staff calculations.

The portfolio equity retained earnings bias is quantitatively smaller and with no clear trend.

Portolio Equity Retained Earnings Bias
(Percent of GDP)
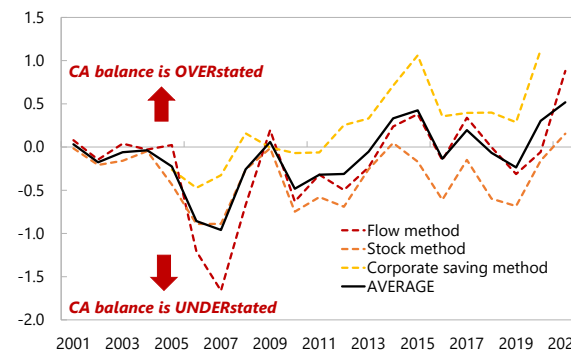
Sources: National Authority; Statistics Denmark; and IMF staff calculations.

D. The Role of the Primary Income Balance

19.   The rising NFA of pension and insurance companies coincided with declining global interest rates and increasing 'search-for-yield' pressures prior to the pandemic. Similar to other sovereign safe assets, the yields on Danish government bonds had trended downward, partly reflecting stronger demand for money-like assets (Krishnamurthy and Vissing-Jorgensen 2012; Caballero et al. 2017; Maggiori 2017; Jiang et al. 2020)—amid regulatory changes following the GFC and secular changes such as aging demographics (Rachel and Smith 2018)—as well as the expansion of central bank balance sheets shrinking the availability of these assets to private investors (Farhi,

Gourinchas, and Rey 2011). These declining yields might also have reflected a slowdown in trend real output growth, inflation expectations stabilizing at low levels prior to the pandemic, and the global saving glut (Mian et al. 2020). Although these forces are prevalent across most advanced economies, cross-country differences in the level and the path of these yields are expected to be jointly determined in equilibrium with global portfolios and capital flows in a preferred-habitat model of bond and currency markets with capital-constrained risk-averse arbitrageurs (Gourinchas et al. 2021).

Sovereign Yields
(Percent, 10-year)

Sources: Refinitiv; Bloomberg; and IMF staff calculations
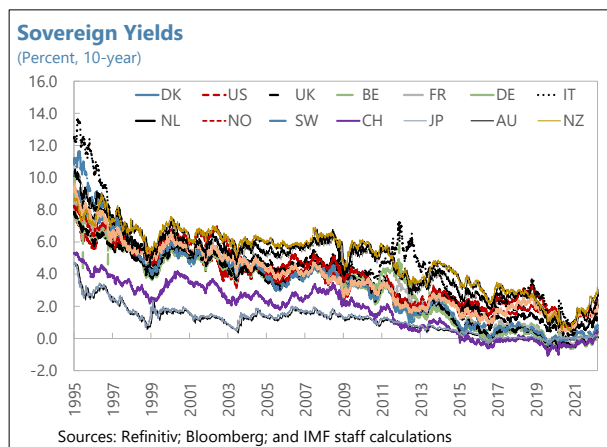
20.   Staff construct a Danish sovereign yield premium to explore the extent to which these cross-country differences could also reflect differences in the convenience benefits that these safe assets provide. A positive convenience benefit would indicate that yields are below a risk-free rate bond of the same tenor. Specifically, we explore the extent to which the relative safety of Danish government bonds contributes to lower Danish yields. The Danish yield premium is defined here as the difference between the convenience benefit of Danish local currency government bonds and corresponding convenience benefits of other government bonds (see Annex III for technical details).[14,15] We follow Du et al. (2018) and Paret and Weber (2019) in defining the yield premium relative to other developed economies' government bonds.

21.   Staff find that the Danish sovereign yield premium had increased following the global financial crisis. Taking a simple average of the Danish premium at the 10-year maturity vis-à-vis other advanced economies, the premium turned positive during the global financial crisis and has remained above zero since then, peaking at close to 100 basis points during the European sovereign debt crisis. In the cross-section, the premium vis-à-vis the US is largest likely reflecting the secular decline in the specialness of long-term US treasuries. The average premium vis-à-vis euro area countries follows a similar pattern as the overall average, although the premium vis-à-vis Germany has no clear trend.

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[14] We measure the premium vis-à-vis the sovereign bonds of Australia, Canada, Germany, Japan, New Zealand, Norway, Sweden, Switzerland, the United Kingdom, and the United States. These are chosen based on their perceived default risk and credit quality and the use of their bonds as savings and collateral instruments.

[15] The Danish covered bond market is many times larger than the government bond market and some covered bonds serve as high quality liquid assets for regulatory purposes. Nevertheless, they are not perfect substitutes for government debt (Economic Memo 2021). There is active academic literature regarding private money creation (Sunderam 2014; Krishnamurthy & Vissing-Jorgensen 2015; Infante 2020).

The Danish premium has increased on average since the global financial crisis....

Danish Bond Premia[1]
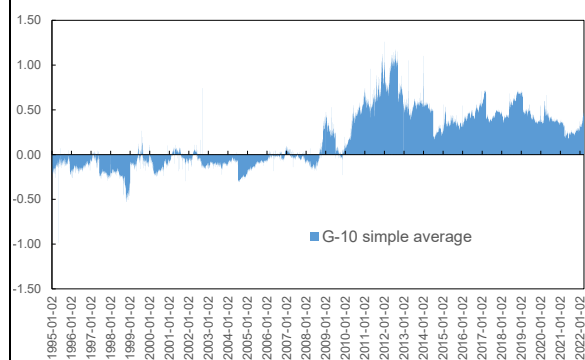
(Percent)

Sources: Refinitiv, Haver Analytics, IMF staff calculations.

1/ $y_{i,t}^{gvt} - [IRS_{i,t} + BS_{i,t} - IRS_{DNK,t}] - y_{i,t}^{DNK} + BS_{i,t}$

There is a notable cross-country variation in the dynamics of the premium.

Danish Bond Premia[1]

(Percent)

Sources: Refinitiv, Haver Analytics, IMF staff calculations

1/ $y_{i,t}^{gvt} - [IRS_{i,t} + BS_{i,t} - IRS_{DNK,t}] - y_{i,t}^{DNK} + BS_{i,t}$

22.   Staff estimates indicate a statistically and economically significant positive correlation between Danish yield premia and Danish net international investment positions. The analysis is loosely based on the preferred habitat model and the idea that the portfolio holdings of insurance and pension companies might be linked to the c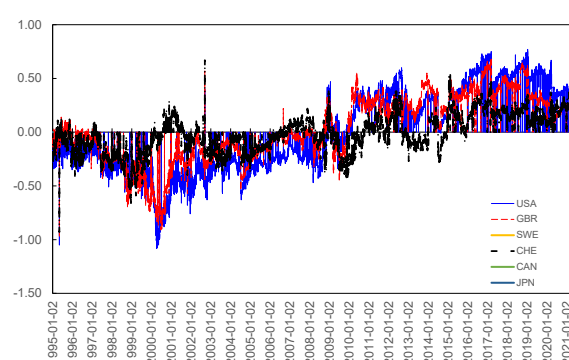onvenience premia on domestic and foreign bonds. Using panel regressions and the local projections method of Jordà (2005), we estimate the cumulative impulse response of the country-specific NFA over 20 quarters to a change in the country-specific risk-premium. Results

NFA Correlation with Danish Sovereign Yield Premium

(Percent of GDP)
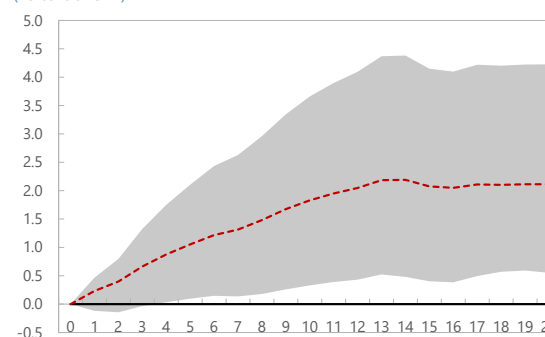
Sources: Refinitive, Bloomberg, IMFWEO, National Authorities

indicate that a 1 standard deviation increase in the average premium (roughly 50 basis points) corresponds to a 2-percentage points increase in the NFA as a share of Danish GDP at the end of 20 quarters.[16] Note that the absence of instruments for our chosen metric of the sovereign yield premium precludes a causal interpretation of the estimated effects. Nevertheless, the results suggest these endogenous objects—Denmark's NFA and the specialness of its sovereign bonds—are related.

23.   Changes in Denmark's sovereign yield premium are more likely to affect Danish investors' foreign portfolios than foreigners' Danish portfolios. We decompose the NFA into gross foreign asset and liability positions to explore which of these is more likely to adjust with changes in Danish premia. We consider similar specifications of the local projections approach above, replacing the NFA with the global foreign assets (GFA) and gross foreign liabilities (GFL) as a share of GDP. The decomposition into gross foreign portfolio positions reveals a positive association between the Danish premium and the Danish GFA over 20 quarters. That is, an increased premium

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[16] The result shows the impact on the NFA of an increase in the average premium of one country, and might therefore appear relatively small in magnitude. However, the overall effect of an increase in premia vis-à-vis several countries could result in a potentially very sizeable effect.

(or lower Danish yields) is associated with larger foreign asset positions as a share of national income for Danish residents. On the other hand, the relationship between Danish gross foreign liabilities—international investors holdings of Danish assets—and the computed sovereign premium is not statistically different from zero. Decomposing these positions further into portfolio composition—FDI and portfolio equity (see ¶8); loans and debt securities—maturity and currency— would shed further light in attributing the long-run expansion of Denmark's NFA.

GFA/Y Correlation with Danish Premium **GFL/Y Correlation with Danish Premium**

Source: IMF staff calculations.
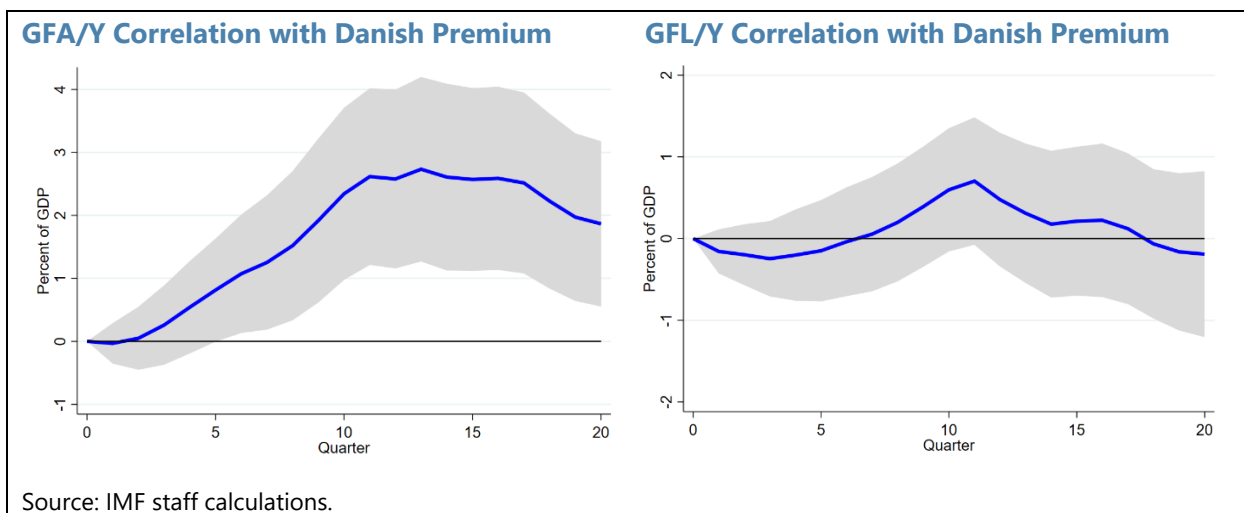
24.   The increase in the Danish premium might be partly explained by the relative scarcity of Danish government debt. As in Krishnamurthy & Vissing-Jorgensen (2012) and Paret and Weber (2019), we construct a plot of our Danish yield premium against the relative supply of Danish government debt to the government debt of other advanced economies in our sample and document a negative relationship.[17] This is consistent with results from a fixed-effects panel regression of the premium against the log of relative debt-to-GDP ratios.

The relative supply of Danish government debt has declined over time...

Denmark's Average Relative Debt
(GDP weighted log of debt/GDP ratios vis-a-vis G10 countries)

Sources: WEO, National Authorities, IMF staff calculations

...and the premium is negatively correlated with the relative supply of Danish government debt.

Danish Premium vs. relative Debt Supply

Source: IMF staff calculations.

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[17] Using debt-to-GDP ratios is an imperfect measure of the relative supply government debt. For example, central banks' asset purchases like those implemented by the ECB could limit the quantity of securities actually available for purchase by private investors. However, we note that the sample contains several countries where this effect should not be prevalent.

25.   These results point to a possible link between a scarcity of Danish government bonds and the international portfolio allocations of Danish NBFIs. On the surface, the results indicate that increasing the relative supply of government debt could lower the sovereign yield premium (thus raising domestic yields) and alleviate some of the search-for-yield pressures faced by Danish NBFIs. This increase would drive the convenience benefit to zero leaving unaffected affecting the credit rating of Danish debt. In the long run, this would lead to a smaller net foreign asset position and consequently a reduction in interest income and, at the margin, the current account.[18] Increasing the relative supply of government debt could be conducted in a way that results in other benefits beyond changing relative risk premia. For instance, green investments financed by debt would help achieve climate objectives. Furthermore, an increased relative of supply of government debt could help deepen local capital markets and support private investment. Ceteris paribus, these would also reduce the Danish current account.
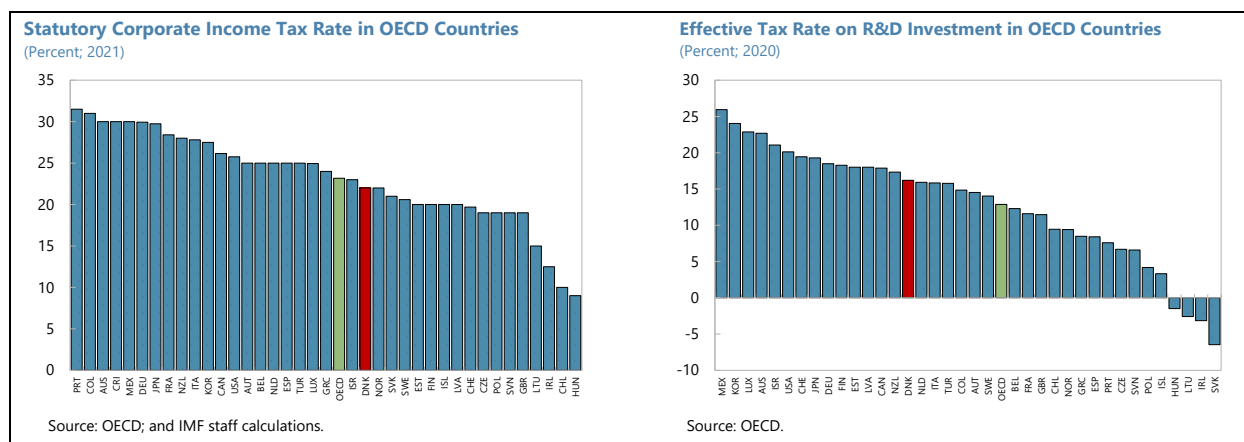
E.   Danish Taxation System

26.   The Danish tax system does not appear to be a major driver of the current account surplus. To the extent that tax policy is not neutral with respect to saving and investment decisions, behavioral responses could affect the external balance. However, in general, tax non-neutrality in the Danish system is qualitatively similar to that in other economies, and are thus unlikely to explain high saving, or low investment, compared to other countries:

- *Savings*. Private pensions and owner-occupied residential property are tax-favored compared to other savings types. Pensions contributions are made out of pre-tax earnings, returns are taxed, and final pensions are also taxed (ETT). This is less generous than in most other countries that either tax contributions (TEE) or pensions (EET).[19] Moreover, evidence suggests that tax-related pension policy has not significantly affected total saving in Denmark (Chetty et al. 2014, Anderson 2018). Owner-occupied housing, as in many other countries, benefits from tax advantages through the nontaxation of imputed rents and (partial) deductibility of mortgage interests. Also, as in most countries, capital gains are taxed only upon realization, thereby incentivizing a 'lock-in' effect to defer the tax by deferring the sale of assets. Overall, the non-neutral tax treatment of some sources of capital incomes and saving vehicles in Denmark are common in other countries, and do not provide a clear tax-related explanation for high savings.

- *Investment*. The statutory corporate income tax rate in Denmark is 22 percent, just below the OECD average of 23.2 percent. The corporate marginal effective tax rate (METR)—that matters for investment decisions as it considers elements of the tax base such as depreciation allowances—is 8.4 percent. Ideally a zero METR would render the tax system neutral with respect to investment decisions (for example by offering an allowance for corporate equity), yet the Danish rate is close to the OECD average of 8.2 percent. While the tax treatment of R&D investment in Denmark is somewhat less generous than in a few other countries, the effective tax rate on R&D investment remains relatively comparable to peers.

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[18] Due to data limitations, this analysis is agnostic with respect to the composition of FDI or portfolio equity through which such an adjustment could occur.

[19] The tax rate on capital gains on pension wealth in Denmark is lower than that of the gains from non-retirement wealth (15.3 percent vs. 27/42 percent). This favorable tax treatment incentivizes pension savings, though this is a feature common in many other countries as well.

Statutory Corporate Income Tax Rate in OECD Countries
(Percent; 2021)

Effective Tax Rate on R&D Investment in OECD Countries
(Percent; 2020)

Source: OECD; and IMF staff calculations.

Source: OECD.

F. Policies

Policies to Boost Investment

27.   Policies that boost investment would help reduce the CA surplus. The case for boosting investment is mainly given Denmark's structural investment needs, notably related to climate change. Investment is also key for potential growth given the constraints on labor supply brought on by adverse demographics. As investment is raised, as a by-product, this would help reduce saving-investment gaps and hence, the CA surplus.

28.   Specific policies should be considered. While the Danish taxation for investment is similar relative to peers (as mentioned above), specific tax policies can incentivize investment. These include tax reforms in the areas of dividend taxation, losses carried forward, and allowances for corporate equity (see Investment Section in IMF 2022). A prompt decision on the tax framework related to proposed Green Tax Reforms could catalyze green investment.

Internal Appreciation and the Current Account Surplus

29.   Relative unit labor costs (ULC) have declined since 2010 which likely have contributed to the sustained increase in the current account surplus during this period. ULC relative to major trading partners have declined as wage growth has fallen behind productivity. These developments have improved Danish competitiveness (relative to trading partners) and contributed to the sustained increase in the current account surplus since the GFC. Indeed, staff estimate of the long-run elasticity of the current account with respect to the (ULC-based) REER is negative—albeit small—around -0.44.[20] As a corollary, this suggests that an internal appreciation via higher ULC should reduce the current account surplus.

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[20] This is based on the latest External Sector Assessment. See Annex III in 2022 Denmark Staff Report. The elasticities are estimated based on a panel regression of the current account balance to REER with controls. Country-specific estimates are then derived based on their respective export and import size.

Relative ULCs have declined appreciably since 2010...   *...as wage growth has lagged productivity.*

Relative ULC: Denmark
(Index, 2010=100)

Real Wage and Productivity in Denmark
(Index, 2010 = 100)

Source: OECD.
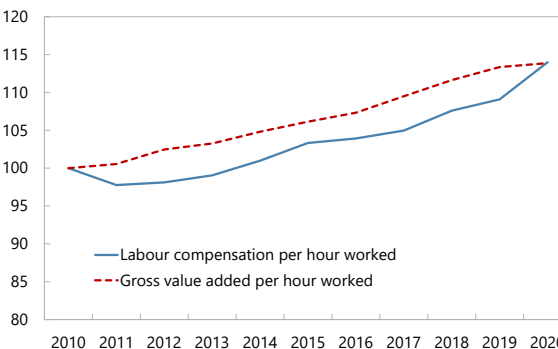
Sources: Haver Analytics; OECD; and IMF staff calculations.

30.   Denmark's wage bargaining framework may have played a role in sustaining its current account surplus. Relative to a decentralized system, a coordinated wage bargaining system makes it easier to restrain wage growth in export industries to ensure competitiveness, resulting in persistent current account surpluses (Manger and Sattler 2020).[21] This is likely an important mechanism in Denmark: its wage bargaining system is well coordinated relative to peers (OECD ICTWSS 2021) and characterized as "pattern bargaining" led by export sectors with a strong focus on competitiveness. While Denmark's wage bargaining framework is well functioning (IMF 2021), it has likely led to the low relative ULC in Denmark, thus contributing to the current account surplus.

Wage coordination in Denmark is relatively strong and centralized...   *...and the bargaining coverage is sizable*
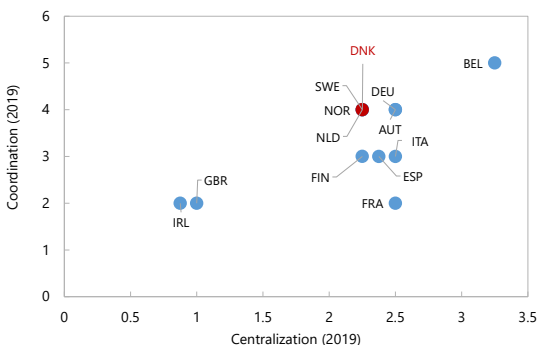
Wage Bargaining Framework

Collective Bargaining Coverage: Cross-Country
(Percent, share of workers covered by valid collective agreements in force)

Source: OECD ICTWSS 2021.
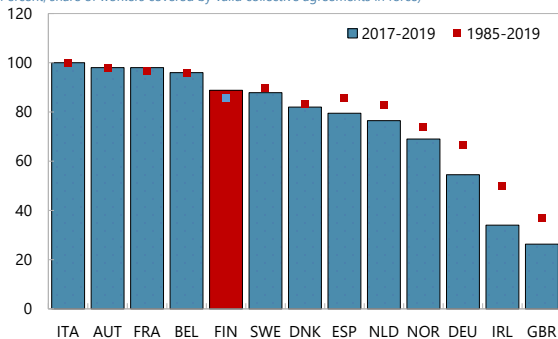
Source: OECD.

31.   Staff present a stylized projection of the current account surplus following an internal appreciation. The scenario analysis seeks to assess: how much of an internal appreciation would be needed to reduce the current account surplus by a given amount over the long term? For this, we deploy the estimated long-run elasticity of -0.44 as above. For illustration, the scenario assumes

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[21] In addition to wage bargaining, other labor market policies can also matter for wage moderation. Refer to Germany Hartz Reforms.

reducing the current account surplus by 2 (3.5) percentage points of GDP—the estimated current account gap with (without) COVID adjusters (See ESA Annex III in IMF 2022). And without loss of generality, the scenario further assumes that such a reduction is achieved by 2030. The key takeaways are neither dependent on the specific choice of the size of the surplus reduction nor the time frame.

32.   The analysis suggests that the required REER adjustment would be quite sizable.[22] This reflects the small elasticity used in the exercise. An internal appreciation of about 4.5 percent would be needed by 2030 just to bring down the current account surplus by 2 percentage points of GDP (Scenario A).[23] To provide some perspective, the absolute size of this adjustment only about 2¼ percentage points smaller than the decline in REER during 2010–19, though a one-to-one extrapolation from this "event" warrants some caution given that the current account balance tends to be subject to many moving parts.

Current Account: Scenarios[1]
(Percent of GDP)

Sources: IMF staff estimates.
1/ Scenario A (B) refers to closing current account gap by 2030 with (without) COVID adjustors.

REER: Scenarios[1]
(Index, 2021 = 100)

Sources: IMF staff estimates.
1/ Scenario A (B) refers to closing current account gap by 2030 with (without) COVID adjustors. Higher REER indicates appreciation.
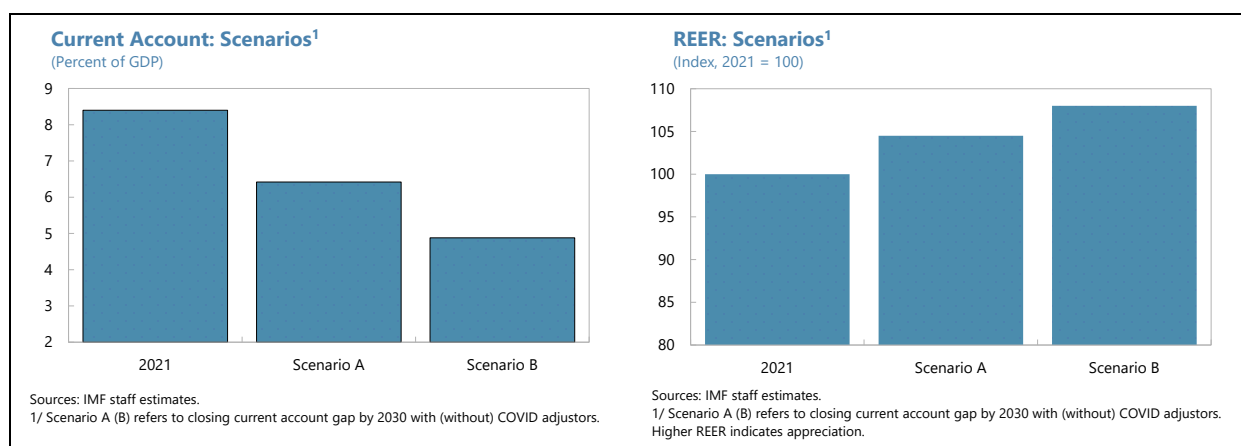
33.   From a policy perspective, the internal appreciation would be achieved by increasing ULC via higher wages. Taking the krone's peg to the euro as given, an internal appreciation would be achieved via an increase in ULC. A declining productivity—keeping wages constant—would deliver an internal appreciation, but this would weigh on potential growth. Thus, the internal appreciation should come from higher wages. Assuming an annualized productivity growth of around 1¼ percent during the projection horizon, *ceteris paribus*, the 4.5 percent internal appreciation, implies an annual nominal wage growth of about 3.8 percent.[24] In sum, the scenario entails a relatively large and sustained wage growth over the projection horizon.

34.   But there are important policy considerations. First, the peg has provided a framework for low and stable inflation in Denmark.[25] The question of whether the peg should be adjusted from

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[22] For a similar point, see Box "Euro Area Wage Developments and External Rebalancing" in IMF REO 2018 Chapter 2.

[23] Of course, a larger appreciation would be needed for a larger reduction of the current account surplus (Scenario B).

[24] The *ceteris paribus* refers to the assumptions that productivity growth in Denmark and ULC in trading partners remain constant. The scenario assumes an inflation of around 2 percent during the projection horizon.

[25] See Monetary Policy section in IMF (2022).

a competitiveness/current account standpoint remains unclear. Second, there is little consensus on competitiveness indicators. For instance, some indicators in Denmark's 2021 External Sector Assessment point to an undervalued exchange rate while others indicate overvaluation. Relatedly, the desirability of being less competitive—as the scenario implies—is also not established. Third, from a normative standpoint, a sustained wage-productivity misalignment would likely entail some inefficiency costs. Moreover, given the already-high inflation and demand pressures, policy has to weigh whether such a wage increase is appropriate in the conjuncture.

Policy Lessons from Cross-Country CA Surplus Reversal Episodes

35.   Staff draw on an earlier analysis of current account reversal episodes. The analysis is based on 28 reversal episodes across countries during 1960–2010 (Abiad, Leigh, and Terrones 2010). These reversals are driven by either a real exchange rate appreciation (in majority of the cases) or a macroeconomic (fiscal/monetary) stimulus. The reversals in Belgium and Finland—small open economies in the euro area—around 2000 are particularly relevant. Both Belgium and Finland experienced large and persistent surplus in the periods preceding the reversal. Both reversals were associated with a persistent appreciation of the REER, much of which was accounted by an appreciation of the NEER as the euro appreciated with respect to major currencies (European Commission 2010). Part of the real appreciation was also due to an increase in ULC as wage increase exceeded productivity, especially in Belgium. Adverse terms of trade—as commodity (import) prices increased more than export prices—also played a role in Finland (IMF 2017).

36.   The analysis provides general policy lessons. First, a surplus reversal—to the extent that they are driven by real appreciation—need not undermine growth, and could result in a better balance between external and domestic demand, and between tradable and non-tradable sectors. Second, best macroeconomic outcomes were achieved when appreciation was complemented with macroeconomic policies that supported domestic demand. Third, macroeconomic stimulus should be gradually withdrawn to avoid overheating the economy and fueling asset price booms.

37.   Some of these lessons are relevant for Denmark. First, as the case of Belgium shows, an increase in wages could contribute to reducing the surplus, but much of the real appreciation was due to the NEER appreciation. This casts some doubt on how higher wages alone could be an adequate mechanism to achieve the real appreciation needed to reduce the surplus, even setting aside the desirability of such an approach. Second, staff's recommendation to boost investment is closer to reversal episodes driven by macroeconomic stimulus. Here, the takeaway, especially from a conjunctural standpoint, is that policies should guard against overheating the economy.

G.   Main Conclusions and Future Work

38.   The main conclusions are as follows. First, Denmark's large current account surplus reflects a saving-investment (S-I) gap mainly accounted by non-financial and financial corporates. Household saving rate is relatively small and pension contributions rate is on the lower end in international comparison. Second, mismeasurement biases are small relative to Denmark's large CA surplus. Third, the Danish tax system does not appear to be a major driver of its current account

surplus. Fourth, the relative scarcity of Danish bonds may have contributed to the rising primary income surplus. Deepening local (non-real estate) debt markets and debt-financed (green) investments may add benefits of changing relative risk premia making Danish investments more attractive, potentially reducing the primary income surplus. Finally. policies that boost investment are key for structural reasons and, as a by-product, would help bring down the current account surplus.

39. **There are several avenues for future work.** First, the extent to which few large multinationals are driving the large and persistent saving-investment gaps in non-financial corporates remains a key question. In that regard, more detailed data on the ownership structure of corporates and their savings behavior would allow a deeper investigation. Second, further analyses of the measurement bias related to retained earnings would be useful. Both avenues would require more granular data.

Annex I. Pension System in Denmark

A. Ageing

1.   **Currently Denmark's population is about as old as the European Union's (EU) population on average, however, future ageing is expected to be slower.** Currently, Denmark has 31 people over the age of 65 for every 100 of working age. This figure is expected to rise to 43

by 2050 while the EU on average is expected to age much faster. Most other Nordic countries on the other hand are expected to reach roughly the same old-age dependency ratio by 2050. This is partially driven by higher projected fertility rates combined with only slightly above average life expectancy in Nordic countries.[1] Other neighboring countries like the Baltic states and Poland are projected to have much higher old-age dependency ratios, while the Netherlands and Germany are projected to have slightly higher old-age dependency ratios.

Projected Old-Age Dependency Ratio
(Percent)

Source: Eurostat.
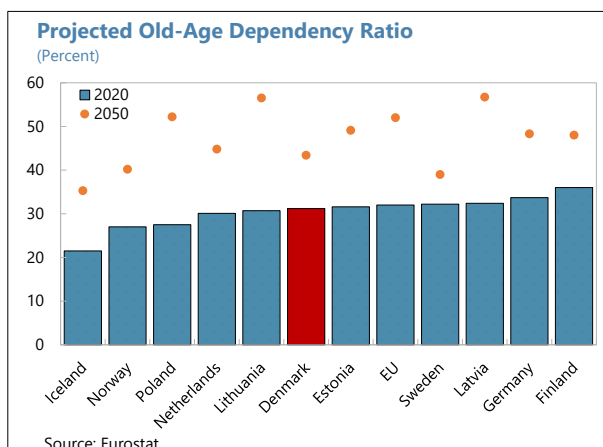
B. The Pension System

2.   **Denmark's pension system consists of multiple layers of old-age income provision.** First, the publicly funded system (*Folkepension*) consists of a basic pension for everyone over the statutory retirement age (currently 67 years) and a social pension (supplement) for old-age individuals/couples with low income. Second, the funded part of the system consists of a defined contribution pension administered by a publicly managed pension fund (ATP) and a wide variety of occupational plans.

3.   **Denmark has a different pension system than neighboring countries.** Sweden and Iceland are most comparable, with the exceptions that Sweden has a notional defined contribution (NDC) system in addition to the basic and funded pensions and Iceland does not have a publicly managed defined contribution (DC). Among neighboring countries, in addition to Denmark, only Iceland and the Netherlands do not have earnings-related first pillar pensions. This has an impact on public spending on pensions and might have an impact on savings. Provided that funded earnings-related pensions are not replacing a PAYGO system, public pension spending in the countries mentioned above will be limited to zero-pillar pensions. While zero-pillar pensions in these countries are relatively generous, total spending compared to earnings-related PAYGO spending is likely to be lower. While publicly vs. privately managed DCs can be a trivial distinction, it might have an impact on reporting on spending and this can have an impact on implicit liabilities. Finally, the relative maturity of funded pensions makes Denmark stand out in comparison with, for instance, the Baltic states, which have introduced (and in some cases already abolished) mandatory funded

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[1] Only Finland has much lower projected fertility.

pensions relatively recently. Denmark's ATP was introduced in 1964 while occupational pensions were widely introduced in the early 1990s.

|	Pension System Characteristics[1]						
	Zero pillar		First pillar			Second pillar	
	Residence-based		Contribution-based				
	Basic	**Social**	**Basic**	**Minimum**	**Earnings-related**	**Public**	**Private**
Denmark	X	X				DC	DC
Estonia			X		(DB) / Points		(DC)
Finland		X			DB		
Germany					Points		
Iceland	X	X					DC
Latvia				X	(DB) / NDC	DC	
Lithuania			X		(DB) / Points		
Netherlands	X						DB
Norway	(X)	X			(DB) / NDC		DC
Poland				X	(DB) / NDC		
Sweden	X	X			(DB) / NDC	DC	DC
Source: Based on OECD.							
1/ Pension schemes in brackets are being phased out.							

4.   Eligibility to publicly funded pensions in Denmark is based on residency but benefits can be reduced based on earnings or income. The full basic amount is about DKK 6.5 thousand per month and the full social pension is DKK 3.8 thousand for a married or cohabiting pensioner and DKK 7.5 thousand for a single pensioner. If someone earns more than three-quarters of the average wage the basic amount is reduced by 30 percent of earnings above this level. A similar mechanism exists for the social pension but taking into account all income (except the basic amount) and with different thresholds and withdrawal rates for singles and couples.

5.   The combination of the basic pension with the social pension leads to relatively high potential benefit levels for those without other old-age income. The maximum benefit someone with no or low old-age income can receive in Denmark expressed as share of the average wage is 38 percent (18 percent from the basic pension and 20 percent from the supplement). In comparison, among neighboring countries only Iceland has a higher potential combined pension coming from a basic pension and social pension. And while the basic pension

Zero Pillar Pensions Benefit
(Percent of average wages)

Source: OECD, Pensions at a Glance 2021.

is higher in the Netherlands, the Netherlands only has a social pension for those not receiving the (full) basic pension. In 2020, the OECD estimated that around a 100 percent of the 65+ population received some combination of the basic pension and the supplement in Denmark.
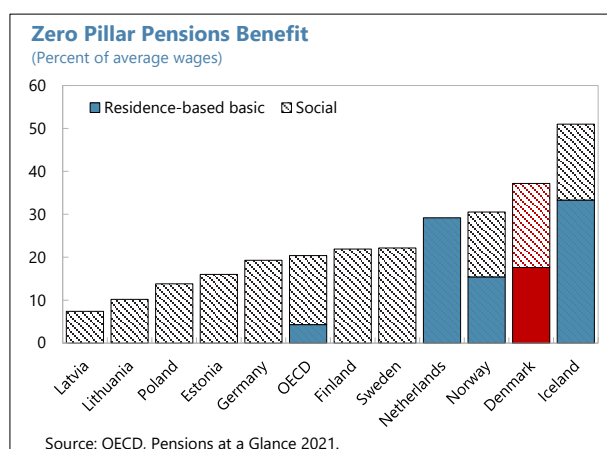
6.   Funded pensions are quasi universal with almost all Danish citizens contributing to the publicly managed ATP and more than 90 percent of employees contributing to an occupational plan. Contributions to the ATP system are flat rate at DKK 284 per month, which is less than 1 percent of the average wage.[2] Contribution rates to the occupational plans are not defined by law but range from 10 percent to 17 percent for more than 60 percent of contributors, with the majority between 10–12 percent.

Effective Contribution Rates (Avg. Wage Earner)
(Percent)

Source: OECD, Pensions at a Glance 2021.
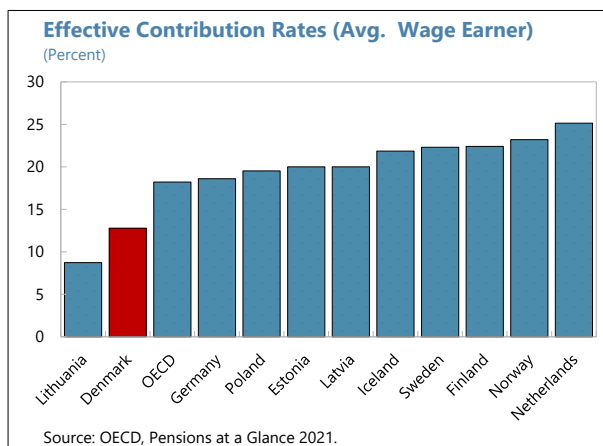
7.   The age at which someone is eligible for a public pension is rising in Denmark. Denmark is one of a handful of countries with a link of the retirement age to life expectancy. The statutory retirement age is linked one-on-one to life expectancy (at age 60) with the increase in the retirement age announced 15 years ahead.[3] Among the OECD countries, only Estonia, Greece and Italy have a similarly strong link to life expectancy.[4] Occupational pensions can be taken earlier, in general three years prior to the statutory retirement age and earlier for some older cohorts . The goal of the retirement age legislation is to limit time in retirement to 14.5 years on average, currently the retirement age is behind on the goal, partially because of the restriction that retirement age increases cannot exceed 1 year every 5 years.

C. Outcomes

8.   Aging puts a clear upward pressure on public pension spending, but Denmark spends less than the EU on average. In 2019, Denmark spent 9.3 percent of GDP on publicly financed pensions compared to 11.6 percent in the EU on average. Moreover, this amount is expected to decline because tax financed civil servants' pensions are becoming less common (1.3 percent of GDP in 2019) and the retirement age is increased more rapidly than in most other EU country.[5] Spending

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[2] The mandatory contributions to the ATP system seem quite small to make a difference for the current account/financial stability issues.

[3] Under the current pension reform, the retirement age is planned to increase from 65½ years in 2021 to 67 years in 2022 and to 68 in 2030. However, a Pension Commission recently recommended the following main reforms to the government which are currently under discussion: reducing the link between pension age and life expectancy from 2045 onward; more incentives for pension savings by increasing tax deductions; and better targeting of age-related subsidies.

[4] Finland, the Netherlands and Portugal link their retirement age to 2/3rd of life expectancy gains.

[5] The pensions of civil servants are not being phased out, but the employment category of civil servants has seen rapidly falling numbers. This is assumed to be a permanent feature of the public sector. While public pension spending is projected to decline, total age-related spending (e.g., health care, long term care etc.) would increase (European Commission 2021).

on the civil servants' scheme is expected to be negligible 40 years from now as the number of people receiving civil servants' pensions is expected to fall by 99 percent. Spending on the basic and social pension combined amounted to 6.3 percent of GDP, which is close to spending in the Netherlands, which only has a basic pension. Like most EU countries, total age-related spending (including health care and long-term care) is expected to increase over the same period. The European Commission projects the total cost of ageing in Denmark to increase by 1.1 percent between 2019 and 2050.

Public Spending on Pensions
(Percent of GDP)

Source: European Commission, Ageing Report 2021.
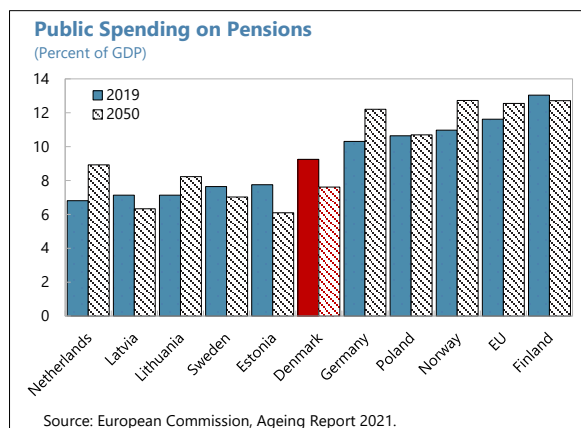
9.   Funded pension provisions play an important role achieving relatively low and falling public pension spending rates while maintaining high replacement rates. While public spending falls, Denmark is one of the few EU countries whose replacement rates are expected to increase in the future (EC, Adequacy Report 2021). This is driven by a combination of rising retirement ages and multiple layers of old-age income provisions, including extensive funded pension arrangements. Compared to OECD countries, for a given career, Denmark has the highest future theoretical replacement rate at 80 percent (compared to an OECD average of 52 percent).

Theoretical Replacement Rates (Avg. Wage Earner)
(Percent)

Source: OECD, Pensions at a Glance 2021.
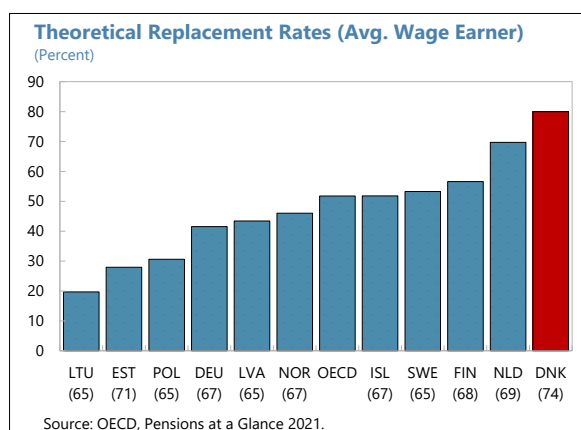
10.   Old-age income risks rest largely on the individual for the DC components of the Danish pension system, but this risk is mitigated by relatively generous basic and social pensions. For defined contribution pensions, investment risk, risk of long periods of unemployment and risks of low earnings are all directly reflected in pension assets and therefore pension benefits. However, investment risk in Danish pension funds is likely reduced by age with life-cycle investment management (i.e., switching from equity to bonds

Replacement Rates by Earnings Level
(Percent)

Source: OECD, Pensions at a Glance 2021.

over the last 10 years of someone's working life). The fact that the Danish pension system is made up of several layers of protection reduces overall old-age income risk. The basic pension in combination with the social pension makes up about half the replacement rate for low earners. The basic pension and the social pension benefit levels are linked to economy-wide average wage growth with the level of the social pension for an individual depending on other pension income.
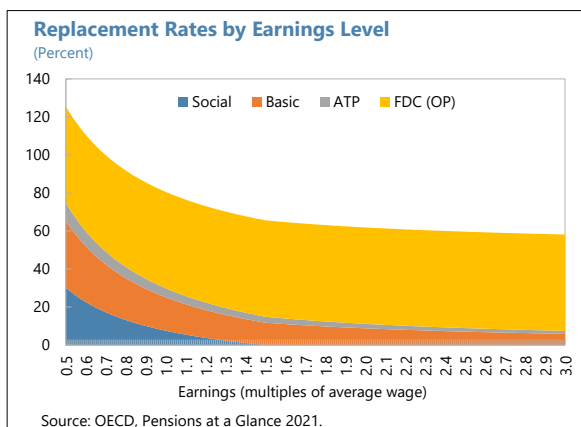
These relatively stable benefits, offset some of the negative impacts of investment risk, periods of unemployment and low earnings. This is reflected in the very low old-age poverty rates in Denmark. Replacement rates for high earners on the other hand are likely largely made-up of occupational pensions. However, higher earners are more likely to have other savings besides pension savings.

11.   The important role and maturity of funded pensions in old-age income provision also leads to high pension assets-to-GDP ratios. Assets-to-GDP ratios exceed 200 percent in Denmark, with only Iceland and the Netherlands exhibiting similar figures.[6] Assets-to-GDP ratios have been rising over the past decade, driven by contributions and returns exceeding pension payments. In 2019 contributions to occupational and private schemes amounted to 6 percent of GDP while benefits paid were 5.3 percent of GDP. Real investment returns in

Pension Assets to GDP
(Percent)

Source: OECD.

Denmark were among the highest in OECD countries at 8.7 percent compared to 6 percent on average in 2020 (in 2019 Denmark was closer to the average).
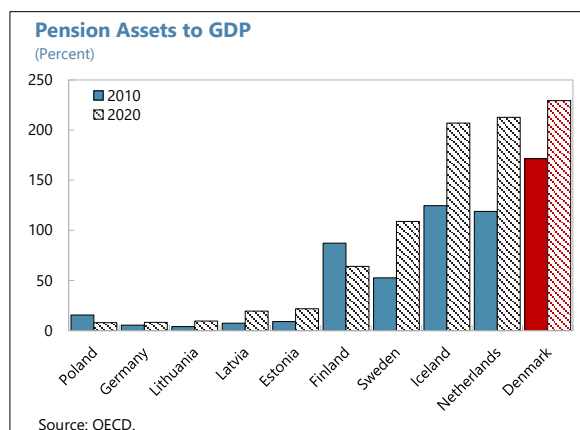
12.   Generally, the link between pension system design and national savings is not straightforward.

- The effect will depend on which part of the pension accumulation phase a country is in. In any funded pension system, the sole purpose of contributions and investments is to be paid out in benefits eventually. Therefore, funded pensions would only increase savings during the accumulation phase during which contributions and returns outweigh drawdowns on assets. For Denmark, this seems to be the case during recent periods which is consistent with the view that Denmark's pension contributions arising from

Contributions and Pension Payments of Funded Schemes
(Percent of GDP)

Source: Danish Ministry of Finance.

the ongoing transition to the fully-funded retirement system create significant structural savings.[7]

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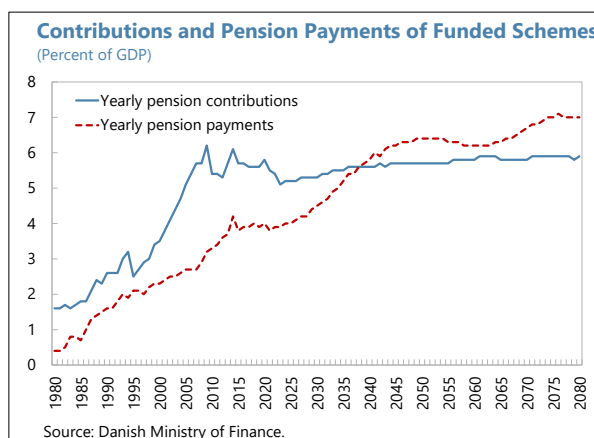
[6] Pension fund asset data: <u>Funded Pensions Indicators (oecd.org)</u>.

[7] The effect of higher mandatory individual savings on the national saving rate is subject to some debate. Some research suggests that higher mandated pension savings need not lead to higher national saving rate because of substitution effects and borrowing considerations by households (Samwick 2000). However, research by the Danish Economic Council (2008) suggests that, in practice, mandatory pension contributions are not fully offset by increases in borrowing or decreased savings elsewhere.

- If funded pensions are replacing PAYGO pensions, the effect will depend on the treatment of existing entitlements in the old PAYGO system. For Denmark, this would mainly apply to the civil servants' scheme. Without contribution revenue, either taxation or debt needs pay for existing entitlements.

- More generally, mandatory savings through pension systems—private or public—can be offset by lower private savings or higher household debt. Evidence for Denmark suggests that such crowding-out are relevant (Chetty et al. 2014; Anderson 2018). What is striking is that Denmark and the Netherlands—both countries with extensive funded pension arrangements—have high pension assets but also among the highest mortgage debt in Europe.

13.   The funded part of the Danish pension system seems close to maturity. Denmark is close to the point where pension payments exceed pension contributions. Since 2008, contributions as share of GDP have been relatively stable and are projected to remain just below 6 percent of GDP. Pension payments, on the other hand, are rising and are projected to keep rising until at least 2050, exceeding contributions around 2040. While returns on assets exceeding GDP growth could counteract the decumulation of pension assets, the strong increase in assets-to-GDP ratios in the past are unlikely to continue. As the pension system matures, structural savings are also expected to decline, reducing the saving-investment gap and hence, the current account surplus.

Annex II. Measurement Biases: Technical Details

1.   Three approaches are deployed to estimate portfolio equity retained earnings bias. FDI income, whether distributed (dividends) or undistributed (retained earnings), is included in the investment income and current account balances. However, unlike dividends on portfolio equity, retained earnings on portfolio equity are not recorded in the income balance, departing from the underlying economic rationale of attributing income to its ultimate owner.

2.   To estimate the missing component of the income balance, three different approaches are considered, taking into account data limitations and uncertainties about some key assumptions. These approaches rely on stock positions, financial market data, and/or national accounts. The methodologies based on financial market data assume that the portfolio breakdown of stocks included in cross-border portfolio equity investments is similar to the national average reflected in national stock market data, whereas the methodology based on the national accounts assumes that the breakdown of corporate saving is similar to the ownership ratios of the corporate sector. More precisely:

- **The flow approach** relies on recorded income streams on foreign portfolio equity positions to reflect distributed dividends (Adler et al, 2019). Using stock market data on dividend yields and price earnings ratios by country allows to compute an estimate of total earnings and, in turn, retained earnings as a residual. Specifically, the dividend-yield and price-earnings (PE) ratios are applied to the recorded investment income on portfolio equity assets (iA^{PEQ}) and liabilities (iL^{PEQ}) to obtain an estimate of the unrecorded retained earnings in country j:

$$RE_j = re_W * iA_j^{PEQ} - re_j * iL_j^{PEQ}$$

  where $re_j = 1/(dividend\_yield_j \; x \; PE\_ratio_j)\text{-}1$ and re_W is the world average re weighted by the bilateral asset portfolio equity exposures of country j vis-à-vis each other country.

- **The stock approach** relies, instead, on gross portfolio investment positions and stock market data on price to earnings ratios to provide an estimate of total earnings (Adler et al, 2019). Multiplying outstanding foreign portfolio equity positions by stock market data on the dividend yield gives an estimate of distributed dividends. The difference between these two estimates provides an estimate of retained earnings. Specifically, the dividend yield and the price-earnings ratio are applied to portfolio equity asset (APEQ) and liability (LPEQ) stock positions according to:

$$RE_j^{'} = rep_W * A_j^{PEQ} - rep_j * L_j^{PEQ}$$

  where $rep_j = (1/PE\_ratio_j) - dividend\_yield_j,$ and rep_W is defined in the same way as re_W above.

- **The corporate saving approach** combines national accounts and foreign portfolio holdings data to reapportion the share of domestic corporate saving (or retained earnings) attributed to foreign portfolio investors (Allen, forthcoming). This approach complements the existing

methods based on financial market data by capturing activities of multinationals firms in the national accounts but potentially missing in domestic stock market data. It also ensures consistency between the measure of retained earnings and external sector data, as both are compiled using the same statistical methodology (SNA/BOP). In practice, country i's portfolio equity retained earnings bias (on the liability side) is computed as:

$$RE_i^L = S_i \times \left(\frac{for_i \times peq_i}{(for_i \times peq_i) + (1 - for_i)} \right)$$

where S_i denotes corporate saving (net of depreciation), for_i the foreign ownership rate (percentage owned by both foreign FDI and portfolio equity investors in overall equity liabilities of the corporate sector), and peq_i the share of portfolio equity investors among foreign investors (FDI and portfolio equity). The asset side is calculated as a weighted sum of partner countries' portfolio equity retained earnings on the liability side, with the net balance obtained as $RE_i^{net} = RE_i^A - RE_i^L$.

3.   Estimating the inflation bias. Inflation compensation is recorded in the income balance, although from an economic perspective it shouldn't. Income is recorded in nominal terms, departing from the relevant economic notion of real income (Adler et al, 2019). The nominal return on debt assets (i^D) reflects the real interest rate (r) and inflation (π) according to the Fisher equation, i^D = r + π. Higher nominal interest payments due to inflation are recorded as a positive income stream for the creditor, and as a negative income stream for the debtor. However, the associated (anticipated) erosion in the real value of debt associated with inflation (and the related nominal foreign currency depreciation) is not recorded as income and leads instead to IIP valuation changes. The inflation distortion can be estimated using data on inflation rates and currency composition of international debt positions (including FDI debt, portfolio debt, bank loans, and FX reserves). Country j's bias can be computed as the expected inflation rate associated with each currency i (p_i) times country j's net debt position in each currency i (NFA^D_{ij}):

p-income$_j$ = S_i p$_i$ x NFA^D_{ij}

- **Data on currency weights** in international debt positions are from Bénétrix et al (2019). This database relies on data from country authorities when available, and estimates otherwise.

- **Expected inflation** is approximated by either the 5-year ahead *consensus forecast* inflation (our preferred approach) or *realized* inflation (when consensus forecast inflation is not available).

Annex III. Primary Income: Technical Details

1.   The Danish yield premium is constructed as the deviation from covered interest parity between government bond yields adjusted for FX swap market frictions. More specifically, let $\gamma_{i,t}$ denote the convenience premium of country i's government bond at time t:

$$\gamma_{i,n,t} = y_{i,t}^{\text{rf}} - y_{i,t}^{\text{Gov}}$$

where $y_{i,t}^{\text{rf}}$ denotes the risk-free rate at time t and $y_{i,t}^{\text{Gov}} = -log(P_{i,t}^{\text{Gov}})$ is the government bond yield and we have assumed that these government bond yields offer convenience benefits which is why they differ from the risk-free rate (Krishnamurthy and Vissing-Jorgensen 2012). Then, assuming covered interest parity (CIP) holds for risk-free rates, the n-year Danish bond premium can be defined as:

$$\rho_{i,n,t} = y_{i,n,t}^{\text{Gov}} - \Phi_{i,n,t} - y_{\text{DNK},n,t}^{\text{Gov}}$$
$$= \gamma_{\text{DNK},n,t} - \gamma_{i,n,t}$$

where $\phi_{i,n,t}$ is the market-implied forward premium in terms of units of currency i per Danish kroner. Adjusting for FX swap market frictions and letting $\tau_{n,i,t}$ denote these frictions, we have

$$\rho_{i,n,t}^{\text{CIP}} = \rho_{i,n,t} - \tau_{\text{n,i,t}}.$$

2.   Using panel regressions and the local projections method of Jordà (2005), we estimate the cumulative impulse response of the country-specific NFA over 20 quarters to a change in the country-specific risk-premium. The baseline specification we estimate is given by:

$$\text{NFA}_{i,t+h-1} - \text{NFA}_{i,t-1} = \alpha^h + \beta_1^h \rho_{i,10,t}^{\text{CIP}} + \sum_{j=1}^{J} \eta_j^h \, \Delta\text{NFA}_{i,t-j} + \sum_{s=1}^{S} \theta_s^h \, \rho_{i,t-s}^{\text{CIP}} + \mu_i^h + X_t + \epsilon_{i,t+h-1}$$

for $h = 1, \dots, 20$ (in quarters) and where $\text{NFA}_{i,t}$ denotes the net foreign asset position of Denmark vis-à-vis country i as a share of Danish GDP; μ_i are country fixed effects meant to capture any time-invariant country-specific characteristics; X_t includes a set of global controls; and $\epsilon_{i,t+h}$ is a random disturbance. The specification is estimated using ordinary least squares for each projection period with quarterly data from 2005q1 – 2020q4. We use heteroskedastic and autocorrelation-consistent standard errors with a Bartlett kernel to correct for potential serial correlation and heteroscedasticity.

3.   The specifications for the regressions with the decomposition of the NFA into gross foreign asset and liability positions are similar to the local projections approach above.

Replacing the NFA with the global foreign assets (GFA) and gross foreign liabilities (GFL) as a share of GDP,

$$y_{i,t+h-1} - y_{i,t-1} = \alpha^h + \beta_1^h \rho_{i,10,t}^{CIP} + \sum_{j=1}^{J} \eta_j^h \Delta y_{i,t-j} + \sum_{s=1}^{S} \theta_s^h \rho_{i,t-s}^{CIP} + \mu_i^h + X_t + \epsilon_{i,t+h-1}$$

where $y_{i,t}$ refers to the GFA and GFL respectively.

4.   Following Paret and Weber (2019), we run the following panel regression using a fixed-effects estimator with robust standard errors. Using quarterly data, the specification for the fixed-effects panel regression relating the increase in the Danish premium to the relative scarcity of Danish government debt is defined as follows:

$$\rho_{i,n,t}^{CIP} = \alpha + \beta \, log \, \frac{\left(\dfrac{debt}{GDP}\right)_{DNK,t}}{\left(\dfrac{debt}{GDP}\right)_{i,t}} + v_t^h + \epsilon_{i,t}$$

where we take the log ratios of the debt-to-GDP ratios of the countries of interest and v_t^h denotes time effects. Standard errors are heteroskedasticity-robust. Table below shows the baseline results with only country fixed effects and an alternative specification with time effects. The results are robust to the use of Driscoll and Kraay standard errors.

	(1) Baseline	(2) Controls	(3) Time_Effects
Fixed-Effects Panel Regression Results			
Relative Danish Debt Supply	-0.560**	-0.450***	-0.548***
	(0.186)	(0.119)	(0.152)
US 10-year Constant Yield		-0.0789***	
		(0.0203)	
Crude Oil (WTI)		-0.119**	
		(0.0414)	
VIX		-0.104*	
		(0.0502)	
No. of Obs.	762	755	762
Adjusted R sq.	0.26	0.40	0.57

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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