
Extended Essay

International Baccalaureate Diploma Programme

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Dutch Disease Evaluation of Denmark's Economic Reliance on Weight-Loss Drugs

Research Question:

To what extent did the economic gains concentrated in the Copenhagen region during Novo Nordisk's GLP-1 weight loss drug boom coincide with, and potentially offset, declines in Denmark's non-pharmaceutical net exports that Dutch disease theory would predict?

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1 Introduction

Denmark has experienced unusually rapid growth in recent years, particularly in the mid-2020s, accompanied by a swift rise in pharmaceutical exports, led by Novo Nordisk and its signature weight-loss drug, GLP-1. This essay offers an opportunity to test for Dutch disease effects by evaluating whether the growth in Copenhagen associated with the GLP-1 boom has also led to losses in the rest of the tradable sector, as indicated by changes in Denmark's net exports outside the pharmaceutical sector.

The focus on Copenhagen stems from the nature of high-value activities related to GLP-1 exports, such as headquarters activities, which are often used to convert export income into local demand. The present study employs standard macroeconomic channels through which Dutch disease effects are believed to operate and utilises secondary macroeconomic data categorised into aggregate demand (AD) components, exchange-rate and price competitiveness indicators, and trade statistics, including the role of foreign demand, particularly from the United States.

2 Dutch Disease Definition

2.1 The Corden-Neary Model

In this analysis, Dutch disease refers to a structural shift in an open economy resulting from rapid expansion in a particular tradable subsector. This, in turn, affects the structure in which the remainder of the economy operates. (Corden & Neary, 1982)

First, the expanding sector generates increasing export revenues. This then attracts resources based on increasing profitability (Ianchovichina & Onder, 2017). Traditionally, this sector has been viewed as an extractive industry. In a more contemporary example, Denmark has an expanding pharmaceutical sector in response to an export boom in GLP-1 medications.

Second, the lagging sector represents other tradable sectors in the economy. This could include manufacturing or other tradable services. This sector competes in the global market based on relative prices. In a scenario where domestic costs are rising, this sector will lose market share unless productivity increases at a similar rate.

Third, the non-tradable sector comprises parts of the economy that are not necessarily influenced by relative prices. In this sector, prices are determined based on local demand. This model is appropriate for analysing a pharmaceutical boom because the driving force in this sector is similar.

2.2 Resource Movement vs. Spending Effect

The model points out two channels for this phenomenon:

1. **Resource Movement Effect:** A booming sector increases demand for production factors, especially for skilled labour. Labour and capital are transferred to the booming tradable sector and its closely related industries. This reduces the resources available to other tradable industries, potentially lowering their output even when external demand for their products remains unchanged. (Bahar & Santos, 2018)
2. **Spending Effect:** Export income increases real national income and boosts domestic demand, especially for non-tradables like services. Since these cannot be imported, demand increases their price. At the same time, the price for tradables is kept down by international competition. This leads to a real appreciation of the exchange rate, meaning that domestic costs rise relative to those in trading partners after adjusting for price levels. This makes other tradable exports less competitive, even if their productivity remains unchanged. (Bahar & Santos, 2018)

For the Danish economy, the booming sector with high demand for skills could draw labour from the tradable sector into the pharmaceutical industry and its closely related industries, while a rise in domestic demand could drive up service prices and tighten the labour market, raising labour costs for other tradable industries (Bresser-Pereira, 2008).

3 Methodology

In the context of Denmark, the nominal appreciation of the real exchange rate is constrained under the pegged regime; therefore, real effective exchange rate movements and external balance results are used to assess competitiveness¹. The paper covers the period from 2020Q1 to 2024Q4, allowing us to examine three distinct periods that are necessary for this type of investigation: 2020-2021 represents the disrupted baseline due to the pandemic; 2022-2023 represents the surge in the growth of exports of GLP-1 products and the impact of the rise in inflation and interest rates that constrained household consumption and aggregate investment; finally, 2024 investigates whether the gains persisted and if there was any impact on competitiveness once conditions returned to normal. This approach helps avoid confounding any underlying structural changes from the past decades with the impact of the specific shock from the expansion of GLP-1 products.

‘Offset’ is defined as a negative change in external performance outside the pharmaceutical sector, proxied by balance-of-payments indicators and composition-based trade measures. ‘Copenhagen gains’ are proxied through domestic activity and income effects in the Copenhagen region using value-added measures and available indicators.

¹ Quarterly or monthly time series data from Statistics Denmark, Danmarks Nationalbank, the OECD, and international trade databases from 2020Q1 to 2024Q4 will be used.

4 Aggregate Demand in Copenhagen

4.1 Catalyst that Triggered the Weight Loss Industry Boom in Copenhagen

Employment links export expansion with household incomes and consumption. If employment in the pharmaceutical industry increases in Copenhagen, incomes rise, and demand for local services grows. This strengthens the ‘gain’ argument and increases the probability that rising incomes will offset AD.

The theory is more evident when the rate of increase in pharmaceutical employment in Copenhagen diverges from a benchmark, such as total employment in the manufacturing sector. A diverging trend will strengthen the resource shift argument in a framework consistent with Dutch Disease effects. This also addresses the research question because rising incomes in Copenhagen will increase the possibility of offsetting demand in other areas where external demand is weak. A rise in export values does not necessarily require a rise in domestic employment. In these² situations, weak domestic employment does not disprove the hypothesis because it reduces the offsetting possibilities and increases the likelihood that external losses will exceed offsetting demand.

4.2 Factors that Affected Consumer Spending in Copenhagen

4.2.1 Consumer Confidence

Household confidence can affect whether they spend or save an increase in income. This is important because export demand booms do not necessarily translate into consumption booms. This

² High productivity, mechanisation, and production stages may disconnect export values from domestic employment.

is because if household confidence remains low due to inflation, housing, and prevailing interest rates, they might save rather than spend, thereby delaying a demand response.

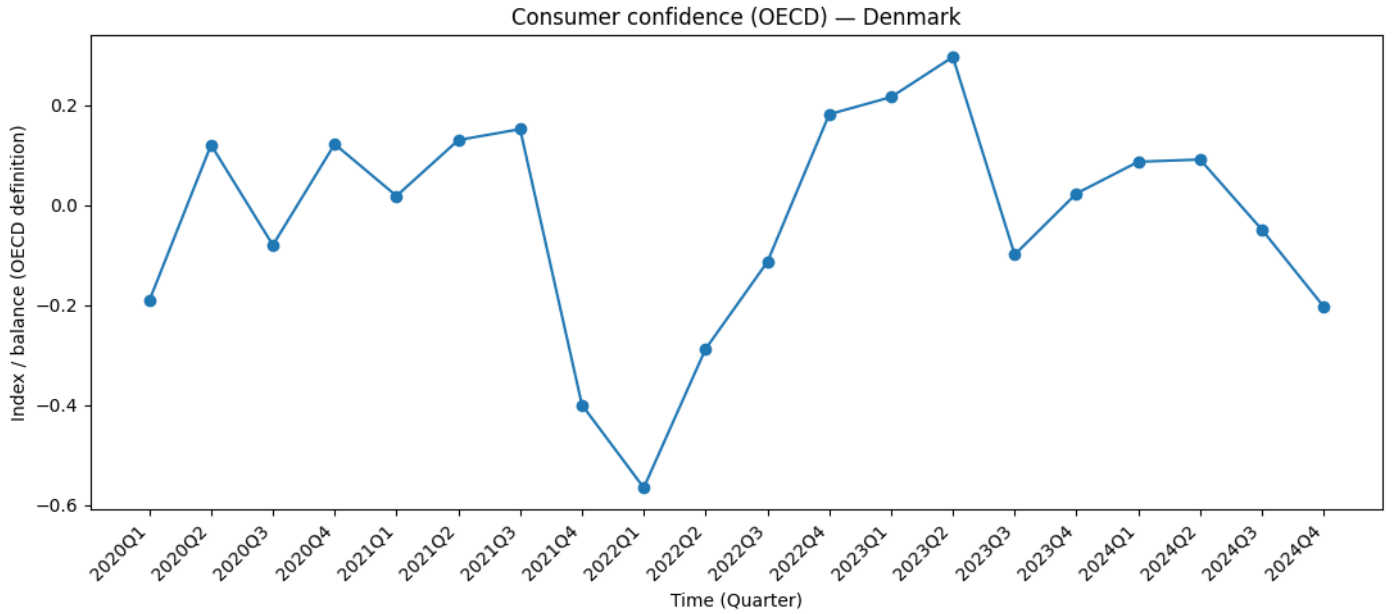


Figure 1. OECD Consumer Confidence for Denmark (2020Q1–2024Q4)

Low confidence in the boom window supports the proposition that the AD response in Copenhagen is limited. *This supports the offset hypothesis because a weak demand response reduces the likelihood that local gains can offset competitiveness losses in other tradable industries.*

This indicator has an attribution limitation because confidence is affected by a range of shocks unrelated to the pharmaceutical sector. Hence, it is considered a transmission constraint rather than a cause of low confidence.

4.2.2 Employment

An increase in pharmaceutical-related employment in Copenhagen will lead to higher incomes in the region. This will have a multiplier effect on local consumption, support the ‘gain’ mechanism, and increase the probability that higher incomes offset AD.

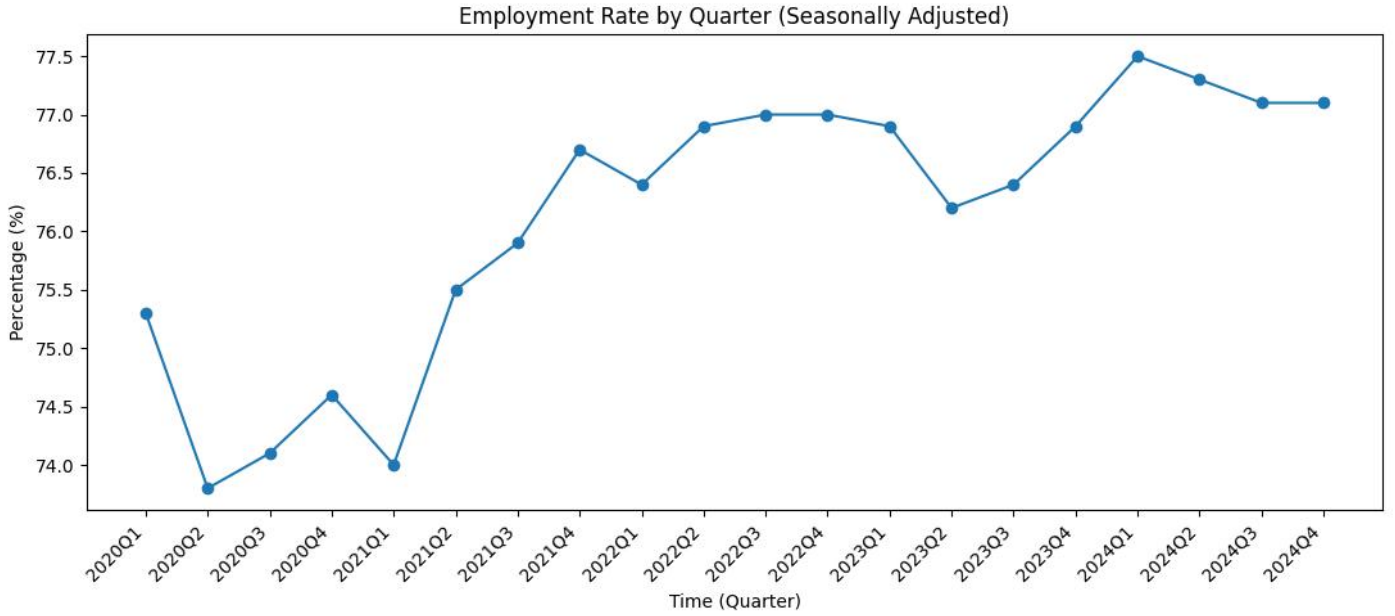


Figure 2. Seasonally Adjusted Employment Rate in Denmark by Quarter

It should be noted that a rise in export values does not necessarily have to occur in tandem with a rise in local employment levels. This is especially true in the event of higher productivity levels in the country. In this scenario, a low employment rate will not necessarily negate a boom.

4.2.3 Disposable Income

Moreover, disposable income affects consumption through its purchasing power. The decline or stagnation in real wages in the expansionary window could explain the absence of significant spillovers into consumption despite the increase in employment. The rise in real wages would then indicate a lagged response in consumption, which is crucial in answering the research question posed in the paper. The delayed response in domestic demand would mean that any adverse change in external competitiveness would emerge first, making the net export offset dominate in the short-run.

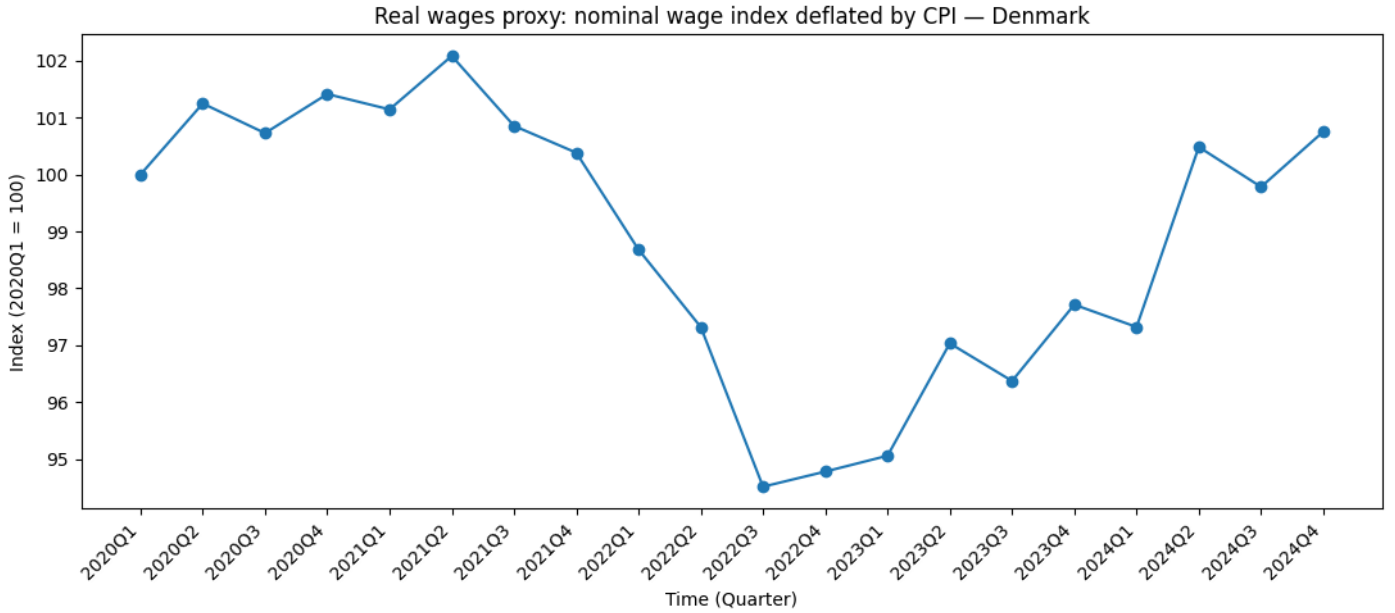


Figure 3. Nominal Wage Index by Consumer Price Index (CPI) for Denmark

The calculation used for the above graph is as follows:

$$\text{Real wage index} = (\text{Nominal wage index} \div \text{CPI index}) \times 100.$$

The first limitation in the analysis is the problem's geographic dimension. The national average wage might not accurately reflect wages in Copenhagen. However, real wages for the nation as a whole represent the inflation environment in which households operate and thus the overall consumption response (Reisinezhad, 2024).

4.2.4 Fiscal Channel

Moreover, the impact of a booming sector on domestic demand will either reinforce or offset the effects of an export-led boom. In theory, a booming sector will lead to higher profits and taxes, providing additional budget in the room to transfer funds to the public sector or to create public-sector jobs. This will add to the ‘gain’ part of the research question (Matsen & Torvik, 2005) (Esquivel, 2025).

In the context of Denmark, it is important to consider whether the fiscal policy setting will support the economy during a period of declining real wages. This will ensure a positive impact on local demand beyond the employed workers. If the government has a restrictive policy setting due to inflation risks or if it saves funds during the boom period, then it will not have a positive impact. This will ensure a positive impact on local demand beyond the employed workers.

A major challenge in this part of the research question will be to identify the impact of a booming sector. *Fiscal policy is part of a broader macroeconomic environment; hence, it will not have a direct impact on a booming sector* (Olanubi, 2023).

4.3 Factors that Affected Investment in Copenhagen

Investment makes up the second important channel through which demand will propagate. A boom may positively influence sector-specific investment through profits and expectations, but tight financial conditions may negatively influence investment in other industries. This is important because investment in the pharmaceutical sector does not guarantee widespread spillovers sufficient in magnitude to offset external losses.

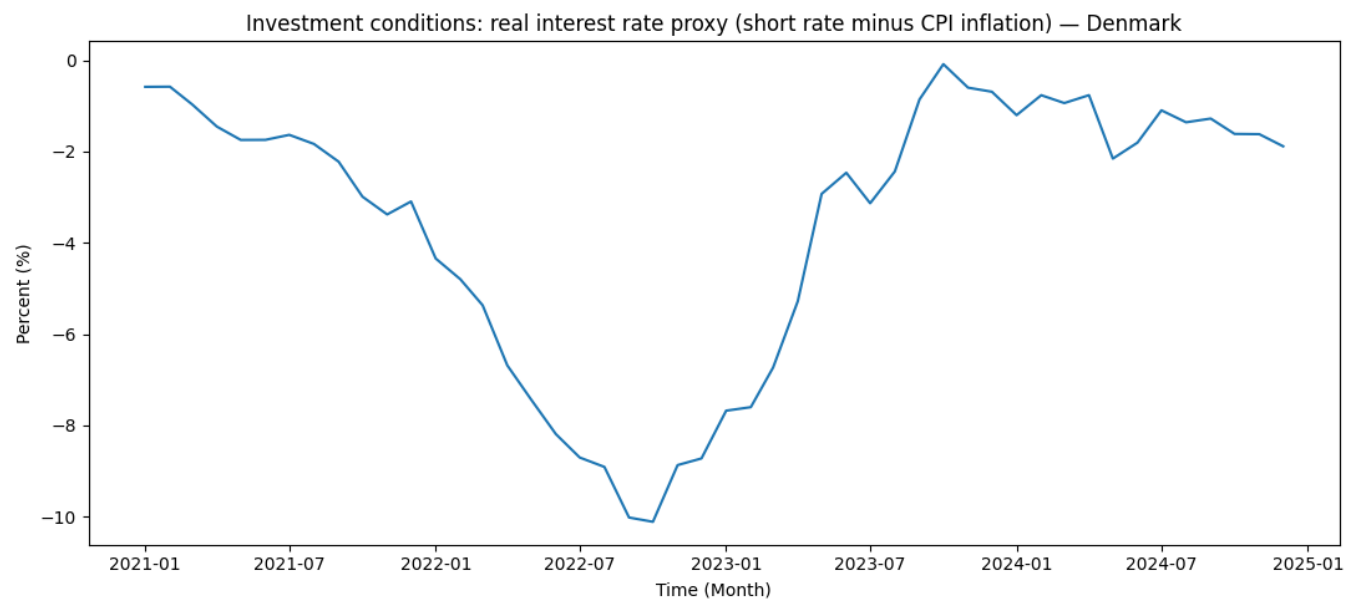


Figure 4. Investment Conditions by Real Estate Rate Proxy in Denmark

The proxy for the real interest rate will serve as a cost-of-capital indicator. If real interest rates rise during the boom window, investment in other industries will become difficult to sustain, even with pharmaceutical profits. If gross fixed capital formation weakens or grows slowly, this implies that Copenhagen's AD response will primarily rely on services and consumption rather than on capital increases across industries (Jeppesen, 2025).

Another structural feature is that multinationals can earn profits in their domestic markets but invest in other economies. This will limit the linkages between export proceeds and capital formation. In this case, investment data may not accurately reflect the economic magnitude of the boom while supporting the argument that spillovers to other industries are minimal.

4.4 Sector Shifts

To test for Dutch Disease, it is necessary to demonstrate that the pharmaceuticals sector represents the expanding tradable sector. This can be done directly by composing exports. Evidence of a rising share of pharmaceuticals in total goods exports suggests greater concentration and reliance on a single tradable sector, thus making Dutch Disease more relevant (Torvik, 2001).

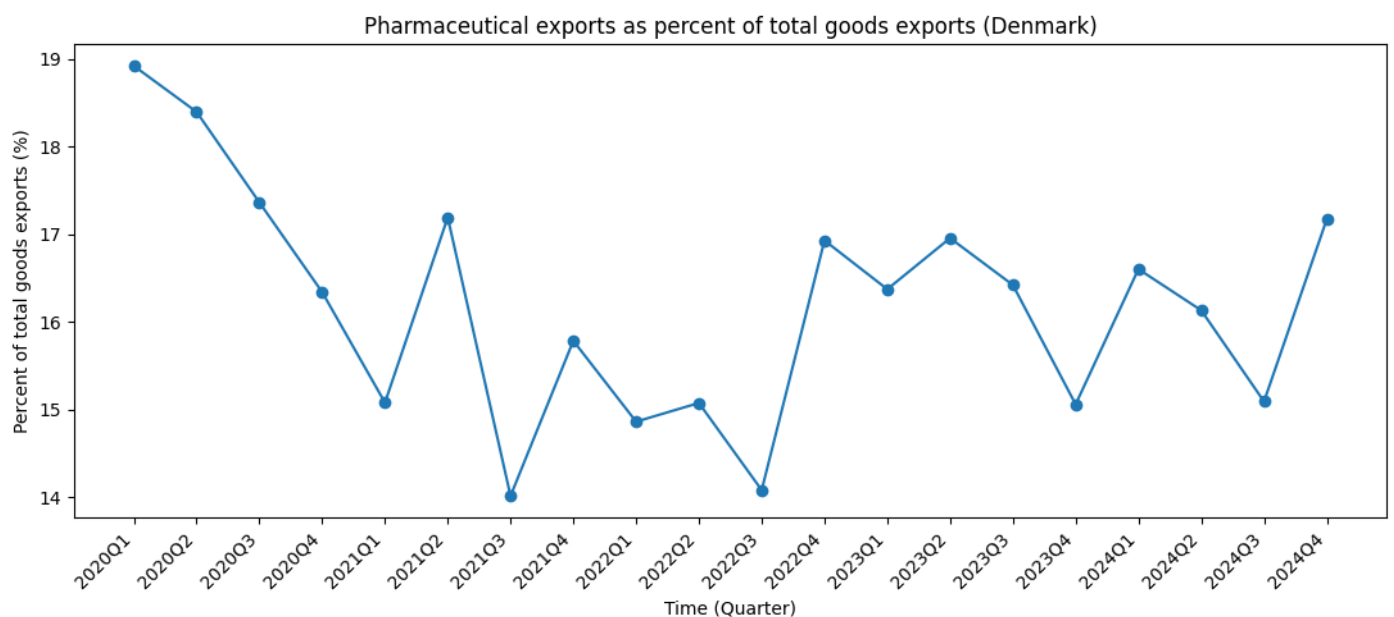


Figure 5. Pharmaceutical Exports as a Percentage of Total Goods Exports in Denmark

The offset mechanism refers to the implications for the remainder of the external sector. Exports may be rising even if other tradable sectors lose ground, since the rising share of pharmaceuticals can offset weaknesses in other areas. The balance of payments helps address this problem by focusing on net values rather than gross export values, which can be distorted by merchanting and MNE supply chains.

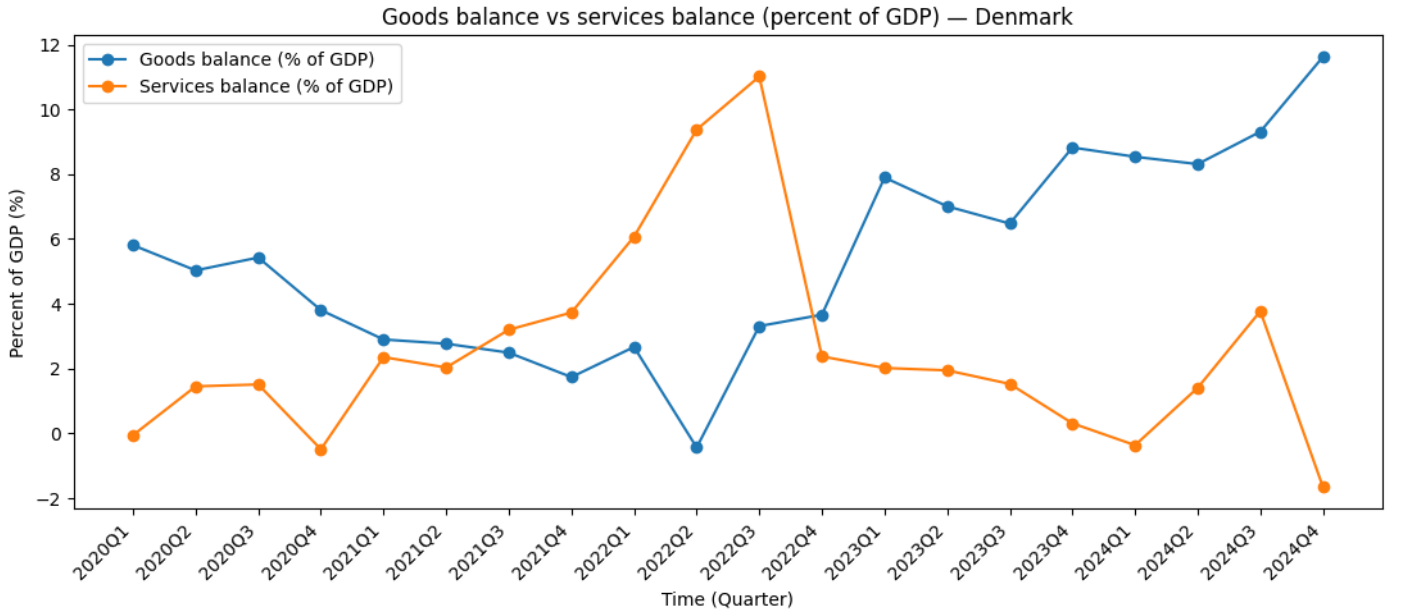


Figure 6. Goods Balance and Services Balance as a Percentage of GDP in Denmark

Balances in goods and services must be treated with caution. Falling services surpluses may simply indicate a natural freight cycle, not a loss of competitiveness. Thus, balance movements are seen as providing supporting evidence alongside other indicators, including indicators of competitiveness and results from domestic channels (Andersen, Huber, Johannesen, Straub, & Vestergård, 2022).

4.5 Visualising and Quantifying the Impact of Consumer Spending and Investment on Copenhagen's GDP

This subsection situates the examination of domestic demand channels within the context of the central research question by articulating the ‘Copenhagen effect’ in quantifiable terms (Komatsuzaki, 2024). The goal is to ascertain whether there is movement in Copenhagen's output and activity consistent with a concentrated boom, and whether this movement aligns with the channels of consumption and investment previously discussed.

The evolution of value-added in Copenhagen relative to that of the pharmaceutical industry and an economy-wide benchmark will be used. If value-added in the pharmaceutical industry grows strongly while value-added in the broader Copenhagen economy grows less strongly, this supports the notion that the boom is indeed strong but only partially integrated into the broader local economy (Matsen & Torvik, 2005).

A strongly concentrated pattern suggests that domestic spillovers are limited, thereby increasing the probability that any loss in competitiveness in other tradables indeed constitutes an offset rather than being offset by spillovers in the local economy (Constantinea & Khemrajb, 2025).

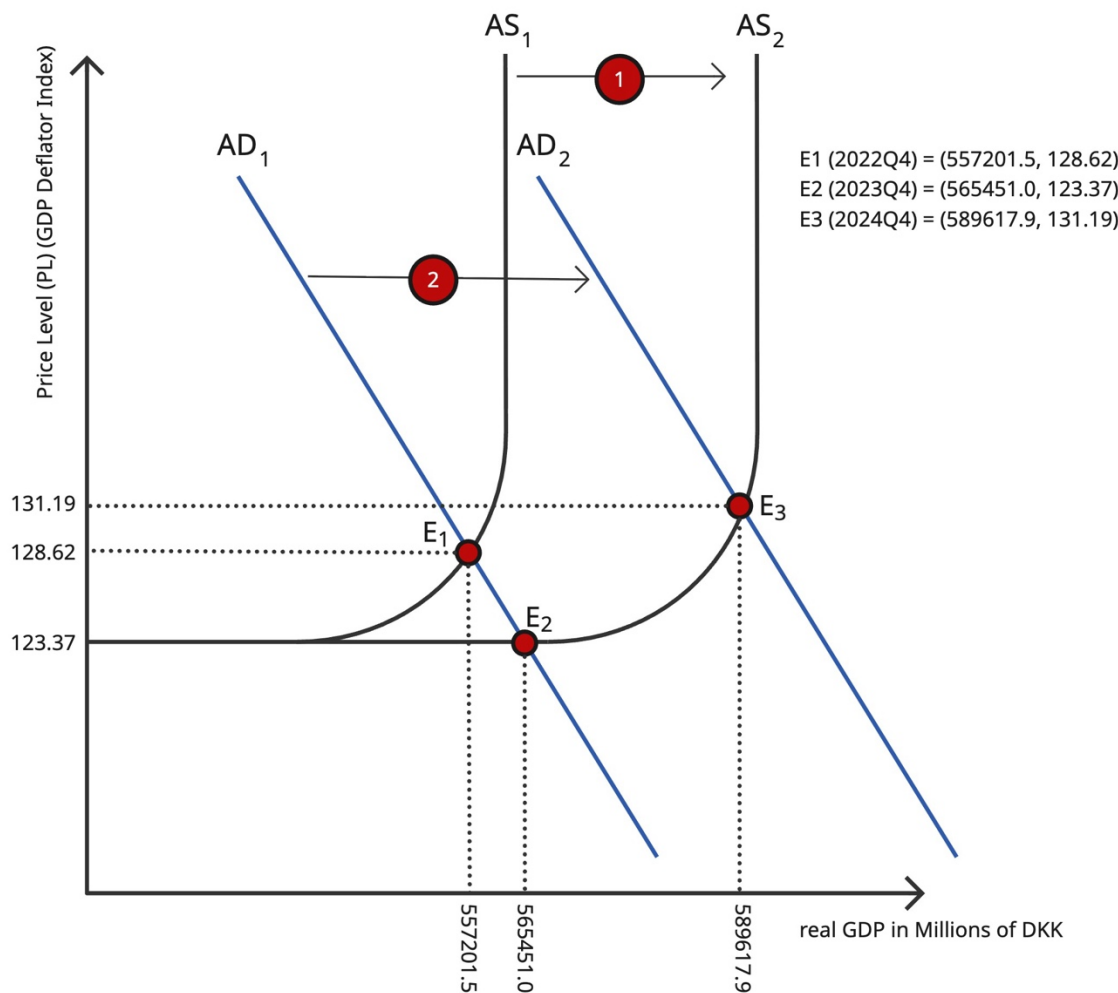


Figure 7. Keynesian AS model of Denmark, 2022Q4-2024Q4. Real GDP is measured in millions of chained 2010 DKK. The price level is proxied by the implicit GDP deflator, defined as $100 \times \text{nominal GDP} \div \text{real GDP}$. (European Commission, Eurostat, 2025) (Andersen, Huber, Johannesen, Straub, & Vestergård, 2022) (Novo Nordisk A/S, 2025) (Novo Nordisk A/S, 2025) (Komatsuzaki, 2024) (IMF Staff Country Reports, 2024)

Figure 7 illustrates the domestic channel for the 'Copenhagen effect' in the context of the Keynesian model of the economy. The economy starts in the equilibrium position E_1 in 2022Q4, with real GDP of 557,201.5 and a price level of 128.62. The economy then moves to the new equilibrium position E_2 in 2023Q4 with a real GDP of 565,451.0 and a price level of 123.37. Real GDP increases by 1.48%, while the price level decreases by 4.08%. Within the Keynesian model, this is consistent with a rightward shift in the SRAS curve, as easing on the supply side increases real GDP while the price level decreases.

At this stage of the model, the economic expansion does not manifest as macroeconomic demand pressure. The economy then moves from the equilibrium position E2 in 2023Q4 to the new position E3 in 2024Q4. Real GDP increases to 589,617.9, up 4.27%, while the price level rises to 131.19, up 6.34%. In the Keynesian model, a simultaneous increase in output and prices is consistent with a rightward shift in the AD curve. Within the context of the model in this research, this means the economy is growing due to increased external income from the pharmaceutical sector. The most significant implication is that as the economy moves along the steeper section of the SRAS curve, the proportion of demand pressure reflected in the price level rather than output increases. This is particularly relevant to the research question, as domestic price levels provide the mechanism for the economy to appreciate in real terms and lose cost competitiveness in non-pharmaceutical tradables while the economy continues to grow.

5 DKK Appreciation

In Denmark, the fixed exchange rate of the krone (DKK) against the euro (EUR) limits nominal exchange rate fluctuations. Therefore, the competitiveness channel will be through the real effective exchange rate. An increase in the REER means that costs and prices in Denmark rise relative to those of its partners. If the REER index rises, Danish costs rise relative to partners, so price competitiveness falls. Therefore, non-pharmaceutical industries face reduced price competitiveness abroad and increased import competition at home (Chen & Lee, 2023).

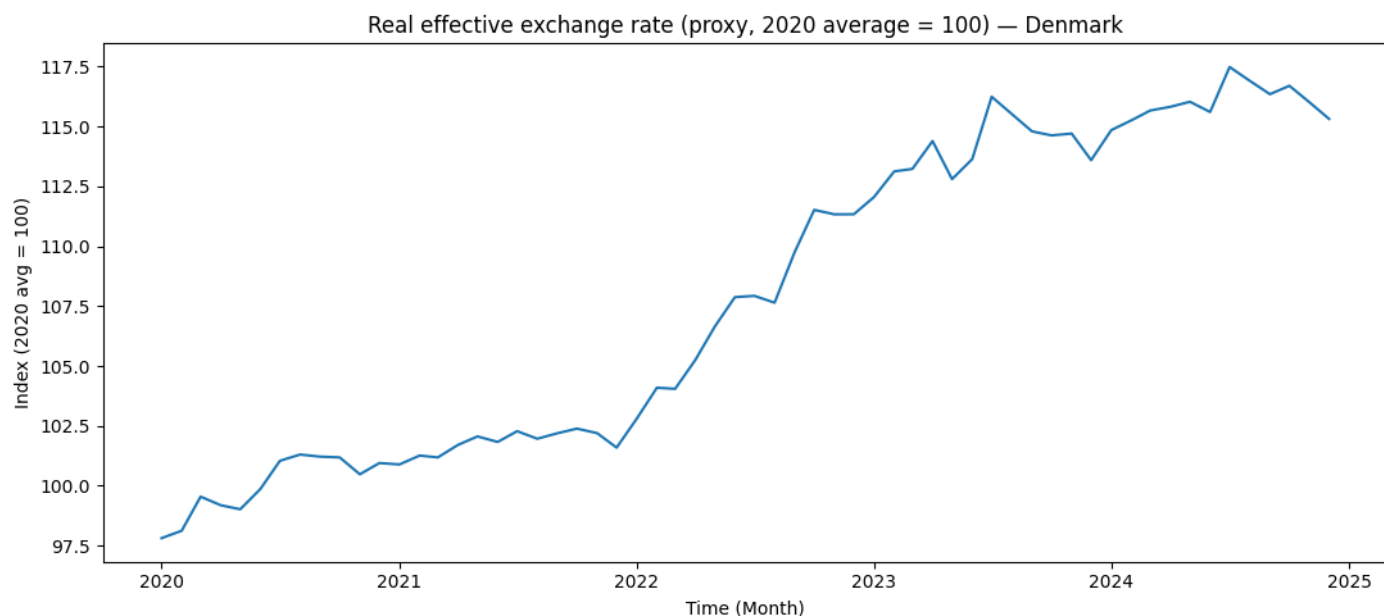


Figure 8. REER with Base Year 2020 for DKK

The increase in the REER during the pharmaceutical boom results from two effects: the spending effect and the resource-movement effect. The spending effect occurs when an increase in exports raises domestic income. The increase in income causes demand for non-tradables such as housing, retail, and local services. Prices increase first in these industries and then in general prices. The resource movement effect occurs when the sector causing the boom attracts labour and capital. Even if the sector operates offshore through merchanting, it can still increase demand for labour with specialised skills in Copenhagen.

These are important considerations because Denmark's tradable sectors outside pharmaceuticals face low margins. If the REER appreciates from 2020Q1 to 2024Q4, the predicted pattern will be relative stagnation in manufacturing output, slower growth in the non-pharmaceutical export sector, and reduced investment in sectors outside the pharmaceutical cluster. This is related to the research question. A revenue gain centred in Copenhagen will offset at the aggregate level if sectors outside the pharmaceutical industry lose relative market shares due to higher unit labour costs and high domestic cost levels.

However, it is important to note that the REER appreciation cannot be considered conclusive in itself. Denmark is a small open economy facing general shocks. Therefore, it is important to consider joint tests. If the REER appreciation is accompanied by a rising share of pharmaceutical exports and a widening gap in pharmaceutical/non-pharmaceutical performance, then the mechanism based on relative competitiveness becomes more plausible. If the REER is stable while non-pharmaceutical sectors are performing worse, then explanations will turn to global demand composition.

6 Export and Import Markets of Denmark

6.1 Export Market

This research question requires the extraction and isolation of pharmaceuticals from the rest of the tradable sector. This is because aggregate exports can grow significantly despite the poor performance of non-pharmaceutical tradables due to the weight or influence a single sector can impose on aggregate performance. This phenomenon is particularly evident in Denmark, where the share of pharmaceutical exports in total goods exports is 24%, up from 18% a decade ago, reflecting a rising trend in the concentration of external income in a single sector.

From a Dutch Disease perspective, export composition is relevant for two reasons. First, it increases the magnitude of the spending effect: a larger increase in export revenues raises national income more, leading to a larger increase in demand and prices for non-tradables. Second, it increases the magnitude of the problem because, in the event of a loss in competitiveness in non-pharmaceutical tradables during the boom period, the economy becomes structurally dependent on a single sector to sustain its external balance. This brings a new perspective to the meaning of

‘offset.’ A rise in the overall goods surplus does not necessarily mean offset in the context of tradables, where non-pharmaceutical tradables lose ground.

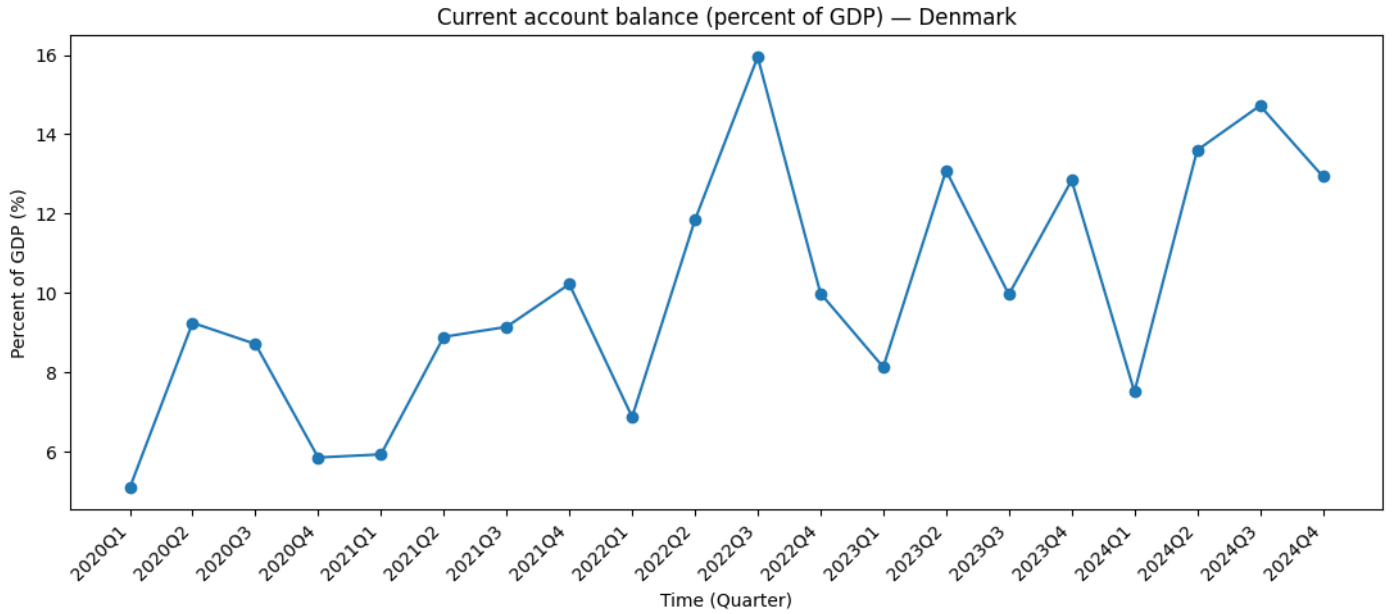


Figure 9. Current Account Balance as a Percentage of GDP of Denmark

The goods sector performance was evident in the boom period. The goods surplus increased from 2.8% of GDP in 2022 to 7.4% of GDP in 2023 ($7.4 - 2.8 = 4.6$ percentage points). This suggests that the pharmaceutical sector grew faster than the goods import bill. If considered in isolation, this undercuts the case that the boom caused an immediate loss in net exports. The boom raised net exports in aggregate but may have constrained non-pharmaceutical tradables through relative price and resource-allocation effects.

The choice of measurement also affects the relationship between export growth and domestic activity. *Pharmaceuticals often have a high value-to-weight ratio and frequently involve processing abroad or even merchanting.* These activities can increase export values without an equivalent level of domestic labour absorption, as is typically associated with traditional manufacturing activities. These factors can reduce the resource-movement effect for low- and mid-skill labour but may increase it for high-skill labour, as R&D, management services, etc., are typically performed domestically. A

mixed outcome is certainly possible: rising wage rates in skilled industries and high local non-tradables prices accompany a relatively modest increase in aggregate manufacturing employment, which is insufficient to generate a large boost in domestic demand.

6.2 Import Market

The income effect boosts imports because rising domestic expenditure increases demand for imported consumption goods, capital goods, and intermediates. The price effect boosts imports if real appreciation reduces the prices of imported goods. These two effects offset net exports, even if exports rise.

The critical issue is whether import demand in Denmark accelerates sufficiently to offset the external benefits from the pharmaceuticals boom. If the positive effect from the pharmaceuticals boom is concentrated in Copenhagen and among high-skilled groups, imports can continue to rise significantly because spending by high-income groups has a large import content, especially for durables, travel, and services. At the firm level, the positive effect of the pharmaceuticals industry can boost imports of intermediates, equipment, and services from abroad that are specific to the industry and require high skills. This import leakage is certainly feasible even if a goods surplus is rising, since leakage can occur with a lag and can appear in other accounts, including services and income accounts. However, the services balance is tricky to interpret because it depends on Denmark's shipping revenues, which are pro-cyclical with global freight rates. A deterioration in service balance during the boom period does not necessarily imply a rise in competitiveness due to real appreciation effects. Instead, it could simply reflect a global freight rate cycle.

The current account is an informative indicator for assessing whether an offset has occurred at the macroeconomic level. A pick-up in pharmaceutical exports and a worsening in the current

account would lend support to the idea that other external accounts deteriorated enough to offset the effects of the export boom. If the current account remains in good shape or improves, then the plausibility of the idea of an offset diminishes further.

7 Aggregate Demand in the USA

7.1 Aggregate Demand in the USA

This section tests whether the apparent expansion in pharmaceutical activity is driven by a sustained external demand shock rather than a simple reallocation between industries in Denmark. When demand from the US improves and remains stable, Denmark faces sustained inflows of export revenues from the expanding tradable sector. This inflow can drive real appreciation and relative price movements that damage competitiveness in other non-pharmaceutical industries (Novo Nordisk A/S, 2025) (Cubanski, 2025). In this case, stronger pharmaceutical export revenue can be associated with weaker non-pharmaceutical net exports, even as GDP increases.

7.2 Visualising and Quantifying the Impact on AD in the USA

US demand conditions are relevant only to the extent they shed light on the persistence of Denmark's rising tradable export receipts. This GLP-1 demand in the US underpins a rise in Danish export receipts in pharmaceutical products, which increases the likelihood of real appreciation pressure and a relative loss of competitiveness in non-pharmaceutical products.

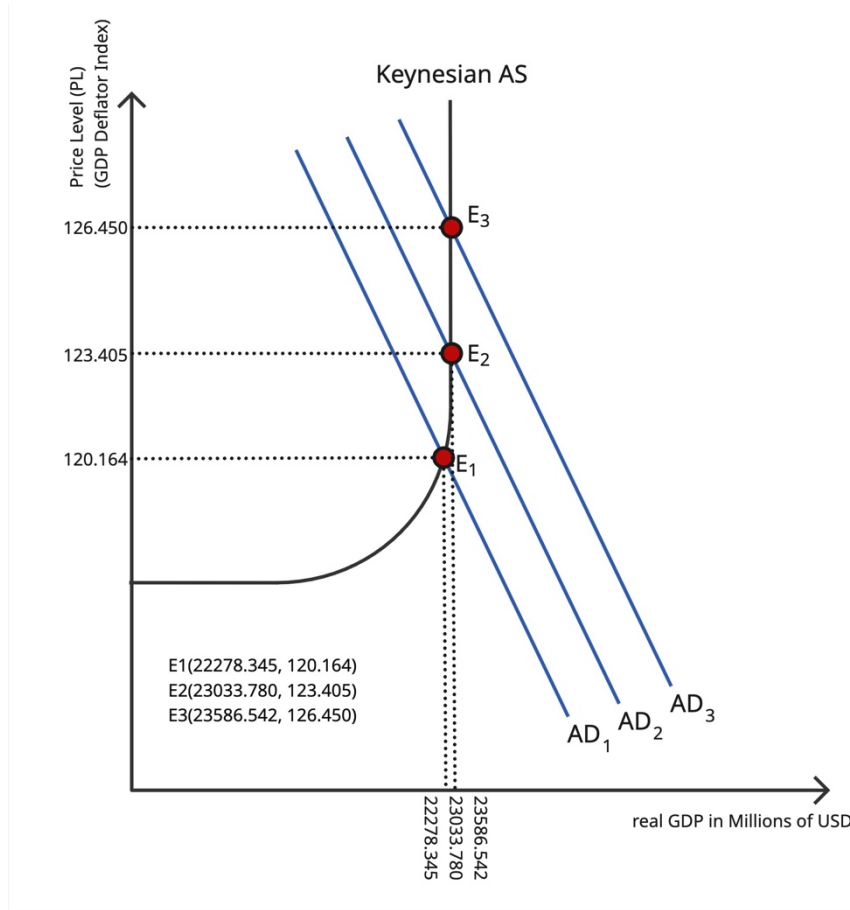


Figure 10. Keynesian AD-SRAS model of the United States, 2020Q2-2024Q4. Real GDP is proxied by U.S. real GDP and indexed to 2019Q4 = 100. The price level is proxied by the U.S. GDP deflator and indexed to 2019Q4 = 100.

The position of US demand as an external influence that maintains the ability to support Denmark's export earnings makes Dutch disease more plausible³. *For the research question, this means that US demand does not, in isolation, "cause" a loss of Danish competitiveness.* It means that continued growth in US demand increases the probability of strong gains in Danish exports, which would likely put upward pressure on real appreciation and cause cost spillovers, possibly at the same time as a loss in non-pharmaceutical net exports. This result is consistent with the logic of the offset effect discussed in the exchange rate and trade sections above, which posits that a sustained inflow is more likely to cause relative price shifts than a transitory demand change.

³ Refer to Appendix 10.2.6 for the numeric data supporting Figure 10.

Aggregate US data is used, but GLP-1 demand is channelled through the insurance system, reimbursement systems, and other elements of health policy. The aggregate demand route should be viewed as a test of the environment's persistence rather than a precise measure of pharmaceutical demand.

8 Conclusion

The research question is applicable as a narrow structural view of the Dutch disease problem. Denmark's macroeconomic strength in the external balance may be matched by a tradable goods deficit in non-pharmaceuticals. At the same time, the pharmaceutical surplus more than offsets the non-pharmaceuticals deficit; the macroeconomic boom offsets the losses, rather than vice versa.

. The GLP-1 surge eventually led to a bifurcation in the economy, with the tradable sector growing rapidly while other sectors performed poorly. Indicatively, the domestic data show that the economy initially experienced a supply-driven expansion followed by a demand-driven expansion⁴. *Thus, the economy experienced an initial rightward shift in the short-run aggregate supply curve, followed by an additional rightward shift in the aggregate demand curve as the boom period continued.*

Two limitations remain pertinent. One is that we have focused on goods trade and a single product category, rather than directly on Copenhagen's value added. We have also ignored services, income flows, and possible switches between price and quantity effects in a period characterised by high inflation in the rest of the world and tight monetary conditions.

⁴ Refer to Appendices 10.3.1 and 10.3.2 for the numeric considerations and the quantisation of the research question.

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10 Appendix

10.1 Indicators

The essay views Dutch disease as a set of hypotheses providing testable propositions rather than a given label. The main variables are specified below:

Variable	Explanation
Exchange rate and price competitiveness	Should the spending effect be present, upward pressure is expected on real exchange rate indicators in Denmark. This can be seen as a nominal exchange rate appreciation, a rise in the real effective exchange rate, and/or policy attempts to curb nominal appreciation.
External balance composition	The presence of a booming industry is expected to cause exports and, possibly, a widening current account surplus. At the same time, a rise in local incomes can increase imports through higher consumption and investment demand. Evidence supporting offsetting losses would be seen in a rise in pharmaceutical exports, accompanied by a deterioration in net exports from other industries, net of price and volume effects.
Exchange rate and price competitiveness	The above model predicts a rising share of GDP from the booming industry, possibly accompanied by stagnation or underperformance in other tradable industries relative to trend. Non-tradable industries can be expected to expand in response to a rise in local demand, especially in urban areas where the income effect is largest.

External balance composition	The presence of a booming industry, especially one dominated by high-paying sectors, is expected to put upward pressure on wage demands and labour recruitment needs across the labour market. Should other tradable industries be unable to match wage levels, they may lose labour, thereby contributing to a reallocation of resources and a rise in unit labour costs that would offset export competitiveness.
Government revenue and policy response	An increase in corporate tax revenues and associated policy space can be used to fuel demand pressures via an expansionary spending policy, but it can also be used to offset long-run risks via a policy stance that stabilises demand and promotes diversification.

Table 1. Dutch Diseases' Variables & Their Explanations

10.2 Considerations Taken Into Account in Visualising US AD Effect

10.2.1 US Consumer Spending

US consumption matters because GLP-1 demand is subject to household budget constraints, insurer support, and the willingness to commit to long-duration GLP-1 therapy. High levels of real disposable income and of labour market tightness increase the probability of persistence in the demand shock. The persistence of the demand shock is the key link to the research question. While a temporary increase in export demand boosts revenues, it is unlikely to affect relative prices enough to offset the negative impact on demand for other Danish exports. In contrast, demand persistence is more likely to offset the effects on Danish competitiveness.

Another channel through which US consumer demand affects the result is why export revenues are rising faster than Danish aggregate consumption. GLP-1 therapy targets a small group of

consumers, and insurers serve as intermediaries. The small group of consumers channels the increase in export revenues into profits and income for specialised labour. As a result, the increase in revenues for Copenhagen is amplified while spillovers into Danish household consumption are limited. This result is consistent with the evidence that local value added grows faster than AD.

A limitation of this is that in the event of binding supply constraints, an increase in US demand raises export values through prices rather than quantities. As a result, supply inputs are less responsive to prices than to quantities. The prediction of the ‘resource movement’ effects of Dutch Disease is reduced.

10.2.2 US Investment

Investment plays a role in the economic upsurge in two ways. First, it relates to capacity expansion in the pharmaceutical production and logistics cluster. High levels of investment in the cluster directly enhance the city’s revenue gains through capital deepening (Constantinea & Khemrajb, 2025). Second, it relates to the opportunity cost of the invested capital. When financial conditions tighten, investment outside the cluster declines. Although this phenomenon might be viewed as Dutch Disease, it might also be seen as the effects of global monetary policy.

The implications of this analysis are important in understanding the offsetting effects. It should be understood that when global interest rates rise, investment outside the pharmaceuticals cluster declines.

10.2.3 US Government Spending

Public expenditure in the United States affects demand through reimbursement and coverage criteria, as well as through the overall public finance stance. A rise in public expenditure or a decrease in cost-sharing criteria could increase demand for imported pharmaceutical products even in a

situation of depressed private expenditure, thereby providing a basis for the asymmetric demand channel. Denmark's export performance is generally stable, despite weakening US consumer confidence, a situation that could reconcile a thriving tradables sector with depressed global demand indicators.

This argument also enhances the relevance of the Dutch Disease phenomenon. A demand shock arising from a policy configuration is more persistent than one arising from a cyclical change in consumption. This increases the likelihood of relative price changes in Denmark, thereby putting pressure on its tradables sector beyond pharmaceutical products.

10.2.4 US Import Market

The United States' import market serves as a direct transmission channel linking US AD to export receipts in Denmark. There are two aspects which are particularly relevant in this context:

Firstly, in the short run, pharmaceutical products are often price-inelastic. This implies that a rise in demand often leads to a rise in export values, even when the volume does not increase immediately. This leads to an increase in Denmark's export values without requiring a reallocation of domestic resources.

Secondly, the exchange rate regime in Denmark directs our attention away from nominal krone movements toward real competitiveness. We are concerned with whether Denmark experiences genuine appreciation during the boom window and whether this is consistent with weaker performance in non-pharmaceutical tradables.

10.2.5 US Export Market

US demand affects Denmark's export market performance by affecting net exports. However, the relevant question here is not whether pharmaceutical product exports increase, but whether the

increase in pharmaceutical product exports is offset by a decrease in non-pharmaceutical exports.

This implies two types of evaluation.

One is composition, in which the share of pharmaceutical products in total export goods will increase during a macro-relevant boom (Corden & Neary, 1982). Another type is displacement, in which the offset in exports occurs through real appreciation or reallocation, as when pharmaceutical exports increase while other export sectors remain stagnant (Corden & Neary, 1982). If other export sectors increase alongside pharmaceutical exports, the Dutch Disease prediction becomes less relevant, and the boom resembles a pure terms-of-trade improvement

10.2.6 Numeric Expansion for Figure 10

Starting at point E1 in 2020Q2, the economy begins with real output well below the 2019Q4 benchmark and the price level close to the initial level. By 2022Q2, the economy shifts to point E2, where real GDP increases from 90.79 to 104.45, and the price level increases from 100.09 to 112.64. This means that the economy increases by about 15.0%, while the price level increases by about 12.5%. In the Keynesian model, a simultaneous increase in output and the price level indicates a significant shift in the aggregate demand curve, signalling the economy's recovery. This is the situation where the sustained US demand for imports remains sufficiently high to support the export boom in Denmark beyond the initial increase.

This movement from E2 in 2022Q2 to E3 in 2024Q4 supports the argument for persistence. Real GDP rises further from 104.45 to 112.17, and the price level rises from 112.64 to 121.00, increasing both variables by around 7.4%. This indicates continued expansion in US demand, though the inflationary effect has diminished from its earlier intensity

10.3 Conclusion Remarks

10.3.1 About GDP Deflators

Thus, the economy's real GDP grew from 557,201.5 in 2022Q4 to 565,451.0 in 2023Q4. The implicit GDP deflator fell from 128.62 to 123.37 in the same period. The percentage change in the implicit GDP deflator is 4.08%, while the percentage change in the real GDP is merely 1.48%. Later, the real GDP grew to 589,617.9 in 2024Q4 after the economy expanded during the boom period. The percentage change in the real GDP is 4.27%, while the implicit GDP deflator grew to 131.19. The percentage change in the implicit GDP deflator is 6.34%.

10.3.2 Quantifying the Research Question

To quantify the research question, the key consideration is to assess the economy's gains in the pharmaceutical industry relative to its losses in the non-pharmaceutical industry. In 2024, the economy exported US\$21.73 billion in pharmaceutical products and imported US\$6.76 billion. Denmark's goods trade balance for 2024 was a surplus of US\$10.49 billion. Hence, the net exports of non-pharmaceuticals are $10.49 - 14.97 = -\text{US\$}4.48$ billion, which is a deficit. If we apply the average exchange rate for 2024, 6.89 DKK per USD, the pharmaceuticals' net exports will be approximately $14.97 \times 6.89 = 103.1$ billion DKK, while the non-pharmaceuticals' deficit will be approximately $4.48 \times 6.89 = 30.9$ billion DKK. Hence, the offsetting balance is $103.1/30.9 = 3.34$. However, the net goods trade balance remains positive at $10.49 \times 6.89 = 72.3$ billion DKK.