# TERMS OF TRADE AND NORTH-SOUTH RELATIONS: IMPLICATIONS FOR FOREIGN WEALTH ACCUMULATION AND COMPARATIVE DEVELOPMENT (1962-2025)

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# Terms of Trade and North-South Relations: Implications for Foreign Wealth Accumulation and Comparative Development (1962-2025)*

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**Abstract**

How critical are terms of trade (and in particular prices of primary goods) in the geography of foreign wealth accumulation and the comparative development of world regions in the postwar globalization? To address this question, I rely on the global coverage of the new WBOP dataset and further split the primary commodities unilateral trade into agricultural, fuel, and mining products categories for the 1962-2025 period. I also construct a world price index of exports for each category of goods relying on the unit value of all 5-digit subheading reported and gathered in UN comtrade. I find that for non-fuel primary commodities the increase in the value exchanged throughout this period is explained by a faster rise in volumes than the increase in prices. I run counterfactual simulations in order to get an estimation of the importance of long-run prices of these primary commodities in the accumulation patterns of foreign wealth and development paths of world regions. For example, if mining products exporting countries would have organized and increased their prices in a similar way as the OPEC, Sub-Saharan Africa would own a substantial foreign wealth in 2025 (+1400% of its GDP vs -43% in reality). Similarly, if agricultural product prices would have followed fuel prices in 1962-2025, it would have allowed Latin America to own a foreign wealth of +490% of its GDP (vs - 30% in reality). I also illustrate the impact of such scenarios on the per capita growth of countries. These results aim at estimating the relevance of the discussion about the role of global trade organization and the correlative set price of commodities in the unequal development of countries around the world.

*Keywords*: Terms of trade, primary commodities, bargaining power, globalization, foreign wealth
*JEL classification*: N50, F62, F63

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# 1 Introduction

With the onset of a low-growth global environment, expectations of convergence in living standards of low and middle income countries to the level of high-income ones is becoming less plausible. The catch-up of low income countries in the first quarter of the 21th century has been slower than in the beginning of the second globalization of the 90s (WB, 2025). This context calls to take a step back from the role of postwar globalization and its institutions in erasing or perpetuating the Nort-South power relations. More specifically, the expectations attributed to manufactured global trade in industrializing and developing the world seems to reach its limits. Trade in primary commodities has remained an important source of revenue for many low- and middle-income countries (LMICs), and continues to be shaped by a North–South divide over the 1962-2025 period.

The implications of the specialization of poorer countries in the exportation of primary goods, inherited from the colonial period, has been the focus of many discussions. The liberalization of the trade of countries of the global South over the postwar period has opened debates about the pervasive effects for resource-rich countries of participating in global trade. In particular, the so-called Prebisch-Singer hypothesis (PSH) maintains that a decline in the relative price of primary commodities with respect to manufactured goods implies a deterioration of terms of trade of developing countries which lead to reduced their growth prospects. A more recent literature, called the natural resource curse (NRC), tries to explain and show evidence on the disadvantages of abundant resources for the development of countries integrated to the global market. Also, unequal exchange theories, which share a similar view to the PSH, states that differences in prices of similar goods along the North-South relation in favor of the market power of high income countries outspan productivity differentials. It emphasize the role in setting prices of commodities of the bargaining power of developing countries, which derive from world wide diffusion of technology, geography of resources and furthermore from world trade organization.

My contribution is to shed light on these debates, about the fair price of primary commodities in international trade, or on whether their relative prices have actually declined, without trying to directly answer them. But instead, by giving orders of magnitude of the implication of different sets of prices on the development and foreign wealth accumulation of countries around the world. This allows us to grasp the relevance of terms of trade dynamics on long-run outcomes. Therefore, I constructed world prices of different categories of commodities and extended primary commodity disaggregation in the new WBOP database (Nievas & Piketty, 2025). And I run counterfactual simulations of alternative trade regimes entailing different price evolutions. This allows a rich comparison between agricultural, mining, and fuel prices and elicits their role in the wealth distribution along the North-South divide. The results highlight the decisive role of their bargaining power for primary commodity exporting countries to benefit from world trade integration.

I find that over this period the prices of mining products have increased much less than the volume exchanged. The price of their exports increased by only 500% (vs 700% for world GDP aggregate price index) from 1962 to 2025 while their volume increased by 2659%. As technical progress is unlikely to explain most of this differential it can be said that trade in mining products has been relatively less beneficial to exporting countries. My simulation shows that it is particularly relevant for the Sub-Sahara Africa region. A small increase in mining product relative prices (+ 40%) would be enough for Sub-Saharan Africa to accumulate a positive foreign wealth in 2025, *ceteris paribus*. In a counterfactual trade regime, where prices of mining products would have followed the prices of fuel (e.g. in the case of a unionization of mining exporter in the line of the OPEC), the NFA position of Sub-Saharan Africa (SSA) and MENA would be reversed. The former owning substantial foreign

wealth in proportion of its GDP and the latter owing substantial debt. Besides, if these additional resources had been devoted to domestic investment in infrastructures and human capital (rather than foreign wealth accumulation) such scenario would allow SSA, Latin America and MENA to converge to a high income levels of GDP per capita of about 32 000 constant 2025 PPP€. Also, although agricultural exports are less specific to developing countries in a world perspective it is still an important share of their own revenue. It is particularly true for Latin America which would reach high income levels of GDP per capita (34 000€ vs 15 000€ in reality) in the case agricultural prices would have followed fuel prices. Also, on the contrary if all gains are invested in foreign assets, this scenario allows Latin America and SSA to own significant foreign wealth (600% and 300% of their GDP respectively). Their path of foreign wealth accumulation is interchanged with MENA, as the latter would reach -450% of its GDP in net foreign wealth (vs +75% in reality).

### 1.1 Related literature

This paper aims at contributing to the literature discussing the impact of the bargaining power of commodities exporters and the resulting terms of trade in the development paths of poor countries. Let's first present the Prebisch-Singer hypothesis (PSH). These authors gave in the 1940s two alternative explanations on why the relative price of primary commodities wouldn't increase as expected by classical economics at that time but declined. Singer's argument lies on the smaller elasticity of the demand of primary commodities to income. Then, technological progress in the manufacturing sector dominated by rich countries at that time would raise their revenue and thus decrease their proportional demand for primary commodities. Prebisch argument is based on the idea that wages are more sticky in rich (manufacturing producer) countries, because unions are more powerful, and hence the prices of manufacturing will be higher. This conjecture leads to the hypothesis of a deterioration of the terms of trade of primary commodity exporters, which were and are still mainly developing countries. This deterioration in the terms of trade is assumed to lower the growth potential of these countries, and particularly for Prebisch, to reduce the gains for these countries to liberalize their trade. It is then directly in contradiction to the heart of the trade economics theory, Ricardian comparative advantages. The latter states that a specialization of developing countries in the export of primary commodities would benefit the exporting country. Note that these discussions apply more specifically to the 1870-1940 period but have been extended for the post-war period. It is important to stress that even if it originally relies on the fact that core countries are manufactured exporters and peripheral countries are primary commodities exporters it may still be relevant to the post-war globalization. Primary commodities are still mainly exported by developing countries or a large part of them are specialized in their production during the 1960-2025 period. More evidence will be given in this paper. This is also why this paper is not directly estimating terms of trade as it has been made in the literature (e.g. primary commodity prices deflated by manufactured goods prices) but rather focuses on comparative evolution of relative prices of different categories of goods.

The principal contribution of this paper is to fill an important gap in the Prebisch-Singer hypothesis literature, eliciting directly the impact on growth outcomes or international investment position of a relative decline in primary commodities. An old survey of Hadass and Williamson (2003), had pointed out that 'Nowhere in this literature has the impact of these terms of trade shocks on long run growth been assessed'. A recent review does not contradict their conclusion. Most papers have been obsessed in trying to best estimate the trend in the terms of trade of developing countries using unit root tests and enlarging the time period (Grilli and Yang (1988), Harvey, Kellard, Madsen, and

Wohar (2010), Arezki, Hadri, Kurozumi, and Rao (2012)). They use different measures of terms of trade but as briefly argued by Frankel (2010) the conclusion is highly dependent on the period chosen since relative prices of primary goods as well as trade structure of developing countries followed different cycles and trends over the centuries. This focus of the literature on the first part of the PSH has been detrimental to the fundamental idea of this kind of analysis. How critical is the bargaining power of primary commodities exporting countries in the global market for their development path? This paper directly delves into this question putting aside the two first steps of the PSH. Which are proving the decline in relative prices then the terms of trade and finally show the impact of terms of trades in the growth path of developing countries. In this paper, terms of trade is not a specific measure as in the PSH or other studies (Gruss & Kebhaj, 2019). Relative prices of commodities directly impact the size of the trade balance of each country and consequently their NFA stock and capacity to invest in the domestic economy.

Therefore, this paper at the same time fills the gap of the literature on estimating the impact of the terms of trade deterioration on developing countries but also overcomes the issue of estimating a convincing measure of country specific terms of trade which links to countries' economic outcomes would then need to be proven. It also covers almost all recorded goods in the UN comtrade database while PSH studies generally rely on up to 44 quoted commodities in international sotck exchange.

A very close literature is the one of the unequal exchange theory which emerged in the 1970s (Amin (1973), Emmanuel (1978)). It is more specific to the post-war globalization period and focuses on differences in prices within the same categories of goods across the Core-Periphery pattern while terms of trade discussions rely on the country's specialization in the world production of primary commodities. This is the main conceptual difference to this strand of literature. Their argument is that differences in market power of monopolistic Western companies as well as trade unions (similar to Singer's argument) would lower prices of developing countries. More broadly, it emphasize the role of the higher bargaining power of core countries in the level of prices of goods exchanged. Even if the present analysis cannot take into account differences in country prices within similar goods, at the level of the aggregate price index of each countries the differences in prices between highly specialized regions or within the same product categories is a similar discussion. This literature gives estimates of the transfer of value from the global South to the North as in Hickel, Sullivan, and Zoomkawala (2021) or show the disconnect between the monetary trade surplus of the global North as a whole and the resource deficit (measured in terms of physical units or hours worked) in Hickel, Dorninger, Wieland, and Suwandi (2022). The latter is called the ecological unequal exchange literature. However, even if they give order of magnitude of value transfer related to alternative prices, they do not give the economic significance of such transfers in terms of foreign wealth or development prospects. This is the contribution of this paper.

Regarding the importance of bargaining power of states over western companies the literature on the influence of the OPEC on oil prices is particularly interesting. In order to highlight the major role a change in bargaining power of exporting countries in the global market of primary commodities could play in their development path, this paper relies on the comparison with the evolution of fuel product prices. This also allows us to show the importance of a particular world trade organization in determining the development path of world regions. The literature can be divided in three questions. One is concerned on the influence of the OPEC on crude oil prices, another on the correct model to characterize the OPEC behavior (cartel, non-cooperative oligopoly etc.) which is close to the first (Fattouh & Mahadeva, 2013) and lastly empirical investigations on the demand and supply influence on oil prices separately (Golombek, Irarrazabal, & Ma, 2018). Obviously, what is of most interest for this paper is the degree at which the OPEC influence prices of oil. OPEC can

be considered a trade union of oil state producers which allowed it to increase the posted price of crude oil (which was the reference price for taxes applied on oil companies). Thus, 1973 and 1979 oil shocks are an unprecedented example of a radical shift in the bargaining power from multinational oil companies to exporting states. This is consensual in the literature. Even if the later role of the OPEC present mix empirical evidence and will deteriorate caused by falls in global demand of oil, the non-cooperative behavior within member countries and the development of new production technology (e.g. shell oil). The dramatic increase in fuel prices from 1962 to 2025 is mostly caused by the two oils shocks (see Figure 16), hence the comparisons and counterfactual built in this paper leverage mainly on this historical experience.

A parallel literature emerged later on, in the 80s, for oil (Gelb, 1988) and minerals (Auty, 2002) and is now called the natural resource curse (NRC). It deals with the comparison between resource-rich and resource-scarce countries to argue that this difference causes the former to have worse economic prospects. The PSH is considered to be part of this literature as a specific channel (Frankel, 2010). But the NRC also includes many cases of adverse effects of windfalls from resource exploitation for these countries. An increase in the monetary resources would be detrimental for long-run growth potentials, which is the opposite of the PSH, even though it is in line with the thoughts of Hans Singer. The two main economic channels are the Dutch disease and the volatility of prices. They can be considered the most reliable channels raised by the literature as they are specific to natural resource exploiting countries as opposed to institutional and political channels (Badeeb, Lean, & Clark, 2017). The first one articulates around the idea that natural resource exploitation leads to an appreciation of the real exchange rate of these countries, and an over investment in the natural resource sector which leads to a deterioration in the competitiveness of other sectors. This literature deals with many endogeneity issues as exploitation of resources cannot be considered predetermined to other countries characteristics (Alssadek & Benhin, 2023). It is close to this paper as they also discuss the implication of international price of commodities. And, it shares the same starting point, the development paths of resource-rich countries don't show signs of convergence to the level of high income countries but rather the opposite. However, the endogeneity issue might be due to the fact they take the trade regime and the institutions of globalization as given. Therefore, the curse they are arguing about might be the curse of trading natural resources in a globalization with flexible exchange rate, integrated liberalized financial markets and with asymmetric bargaining power given to the global North companies perhaps. A goal of this paper is to enlarge the NRC discussion by showing the relevance of investigating the role alternative world trade institutions could play in overcoming the studied curse.

# 2 Data and Methodology

## 2.1 Data

**Primary commodities trade flows.** I mainly relied on the new World Historical Balance of Payment Database (WBOP)(Nievas & Piketty, 2025) that covers the entire planet's unilateral trade flows and world balance of payments for 1800-2025. I focus on the 1962-2025 period in order to further detail the traded goods composition which is already split between primary and manufactured goods. Using the UN Comtrade database, I split primary commodity flows of all countries available in the WBOP into 3 new categories of goods: agricultural, fuel, and mining products. These defined categories are widely used and include the following codes of the SITC nomenclature: agriculture (0, 1, 2, 4), fuel (3) and mining (27, 28, 68). I also include non-ferrous

metals (68) which are semi-manufactured products to follow the choice of including it in primary commodities by the WBOP. Manufactured goods are defined by all other SITC codes (unless the 9). For consistency, I follow the same interpolation and extrapolation methods applied in WBOP on shares in total trade which I then applied to the series available in this database. I also implement world net zero flow correction. Indeed, I apply a proportional adjustment to all import flows such that world imports equalize raw world exports for every year. I also extrapolated them from 2023 to 2025 by taking the average of the two last available years. In the end, I have yearly unilateral exports and imports of agricultural, fuel, mining, and manufactured goods and services for 48 countries and 9 residual regions (aggregates of other countries included in a world region) for the 1962-2025 that I can combine with other series, income and transfer balance to recover current accounts. Most of the results will be presented as aggregates at the level of 8 world regions and the world.

**World price index of goods.** In order to break down these trade series into changes of price and volume, I constructed their corresponding price indices at the global level using unit values from the UN Comtrade database. The lower level of aggregation for these constructed unit values indices is the year x world x flow direction x commodity category. I computed product unit values at the lowest level available for this time period, which is 5-digit in the SITC. This is important to seek to reflect the price of homogeneous goods as much as possible. Also, quantity units change multiple times over time even at the 5-digit within the same country and flow direction. Thus, I harmonize it by preferring the most reported one at this level. Note that for this period there are 2 main changes in international commodity classification. The SITC Rev. 1 covers 1962-1999, the SITC Rev. 2 the 2000-2009 years and the SITC Rev. 4 from 2010 until now. I convert them all to SITC Rev. 1 using available correspondence tables and aggregate trade values and quantities when possible within the new 5-digit codes.

Unit values are calculated by dividing the trade value of each observation by its declared quantity. The year-on-year change is the UVs divided by their previous year value only in the cases where they are reported in the same quantity units. As the reporting process of quantity are subject to many mistakes it is necessary to apply an outlier detection algorithm. I adapted the one from a recent OECD study (Miao & Wegner, 2022), it applies the Asymmetric fence criteria (AFM) on pools of more than 100 observations and the Mean absolute deviation (MAD) criteria on less than 100 observations for the cross-country level and year-on-year changes of UVs (cf. Data appendix).

For the calculation of the unit value index (UVI) of each defined commodity category, I cumulate the geometric average of unit value year-on-year changes weighted by the previous year's share in the total world trade of this commodity (Laspeyre price index). I calculate them arbitrarily at the 1962 reference year. I can have world exports and imports UVIs for the aggregate category of all traded goods, agricultural products and manufactured goods. In general, export UVI and import UVI feature a gap which widens along the period. I assume it is mainly due to the fact exported values are reported free on board (FOB) while imported ones contain cost, insurance and freight (CIF) as most countries follow this recommendation. As the price of these services are known to have decreased during this period, due to the important technological progress, the CIF component included in the world import unit value of each goods slows down their increase relative to world export unit values, which explains the gap. As CIF should be included in a services price index, the preferred proxy for international prices goods is the export UVI. However, for fuel and mining products I take the UVI of both export and import. This is because the number of observations are below 200 for most years and below 100 for some which lead to unrealistic high variations.

I didn't find in the literature price indices which cover as many products and years as this one. The WTO and UNCTAD publish unit value indices of exports and imports at the aggregate level of all commodities but only from 2005 using a similar method. The World Bank published a manufacturing unit value (MUV) in the Pink sheet for 1960-2025, it is also close to the method used in this paper but only takes into account unit values of 15 high and middle income countries. The most recent paper using unit value to approximate prices of traded goods (Miao & Wegner, 2022) leverages on bilateral trade data which allows them to construct country-level price index but only from 2010 to 2020. They also show that despite the flaws and imperfection of using UVI to approximate the price of traded goods, they are still useful because of a lack of other reliable sources of information. It matches aggregated level prices such as 1-digit SITC or global material or agricultural prices.

As already briefly mentioned, unit value indices have many flaws. They do not capture quality changes as it is expected from volume measures. However, it is not a major issue for primary commodities in general, which are our main focus. The issue may still be at play for this relatively long time period. In particular, the bias due to the compositional changes within the 5-digit code might increase with the length of the period. For the scope of this study this level of detail can be considered insignificant. Another source of flaws is the quality of reported quantities. Their reported units vary largely over time and across countries which prevent reliable comparison and are also more misreported than trade values. To overcome this last issue, every quantity unit is considered (not only kg) and the year-on-year change is calculated whenever two successive years are available. Then only the year-on-year changes are compared and the average change is calculated across different quantity units.

Despite some flaws, these price indices remain useful to provide insights at a global level and satisfying long-run perspective. I tried to validate these price indices by comparing them with available global prices for the same period. The World Bank commodity price data (Pink sheet) provided quoted prices for about 40 key commodities 1960-2024. For example, the selected fuel price index closely follows the international price of crude oil (Figure 50). The high variability of cross-country prices for natural gas for example as well as the limited number of observations may explain why the export unit value index has such unrealistically high variations. It could also be due to lower quality of quantity reported for exported goods, as customs generally have more reliable data on imports. This is why I prefer the unit value index calculated from both exports and import unit values for fuel products and mining products. More checks with other commodities and the GDP price index can be found in Appendix C. Finally, these price indices are far from perfect but for the scope of our study of comparing long term evolution of prices from 1962 to 2025 they are satisfying. They could probably be improved by using bilateral trade data and be calculated at the country level but this could limit the global coverage and long term period required for this study.

## 2.2 Method

This paper proposes to test two kinds of scenarios, a fixed increase in the relative price of a particular commodity for the whole period or a change in the price index of one commodity. The simulation methodology follows closely Nievas and Piketty (2025). There are two kinds of simulations, 'financial' and 'economic' (names given by the cited authors). The former is built upon the balance of payment structure only and doesn't include proper economic assumptions. It looks at the changes in world regions net foreign assets (equivalently NFA, international investment position, foreign indebtedness position) as if the gains and losses would only be invested in foreign assets

hence only changing the balance of payment accounting sheets leaving all other flows unchanged. The economic simulations in the opposite take net foreign assets as given and change the growth rate of per capita GDP in PPP terms. It assumes that the gains from the scenarios are entirely invested in domestic human capital by benefiting countries while losses are entirely absorbed by consumption cuts (it doesn't change the growth path of losing countries). The latter assumption is supported by the objective of focusing on the catch-up rate of developing countries rather than the determinants of the growth of rich countries.

These simulations miss many general equilibrium effects, in particular the change in the long-run demand for each commodity in the global production. Long-run prices of commodities can be expected to incentivize a change in the production technology which could then change the quantity exchanged, as well as the productivity path of the production of other goods. Also, the comparative development simulation doesn't take into account any constraints in the use of resources, the growth path of high income countries is very likely unsustainable for the whole planet. It might have been possible because it was not shared by all countries. This could be a very interesting path for improving these simulations as highlighted by the reference paper. Perhaps, adding resource-use constraints may shift the benchmark for convergence away from the one of high-income countries.

The goal is to illustrate the relevance of long-run primary commodity prices, beyond their well commented volatility, in determining the geography of wealth accumulation and per capita GDP growth. They allow us to have a first insight on the relevance of the discussions which consider that alternative global institutions and hence other price setting systems would overcome the structural brakes to convergence and pernicious effects of globalization. Especially, the comparison with fuel prices, and the 1970s OPEC breakaway, allows to underscore the critical role of the bargaining power of exporting countries in determining their development path. A more structural or detailed model could highlight precise mechanisms but this study aims at providing a magnitude exercise.

Financial counterfactual simulation:

$$\begin{aligned} NFA_t^c = [NFA_{t-1}^c &+ r(NFA_{t-1}^c - NFA_{t-1}) \\ &+ tb_{t-1}(1+\alpha_t) \\ &+ IncomeBalance_{t-1} \\ &+ TransferBalance_{t-1}]\frac{gdp_{t-1}}{gdp_t} \\ &- (NFA_{test} - NFA_t) \end{aligned}$$

- $r$ is the global rate of return on foreign assets (it's equal to the rate of return on foreign liabilities at the world level) calculated using the observed data. It's the world inflows of foreign income from abroad over the world foreign asset stock. It allows one to take into account the change in the income balance due to the scenario involving other balances, in particular net trade balances. It thus assumes that 100% of the gains/losses from the scenario are invested in foreign assets/liability (the 'financial' aspect of the simulation) at a world common rate. It therefore also assumes a world without rate of return differential across countries and asset and liabilities well documented by Nievas and Sodano (2024).

- $NFA_{test} - NFA_t$. As cumulated current account misses the valuation effect and the error and omission (EO), this term corrects for the actual differences between the cumulated current account and the actual reported NFA in the IMF balance of payments sheets. $NFA_{test}$ is hence the estimation of the NFA through this equation with parameters set to baseline

($\alpha = 0$). Note that these simulations are done in the 1970-2025 period, because of more reliable and consistent actual IMF data.

- $tb$ is a vector of trade balances of each category of goods. While $\alpha$ is the associated vector of scenarios rate of change in their price. This is the key parameter of the simulation. In the first kind of scenario it is the same value for every year, representing an increase in relative price of a particular commodity or group of commodities. In the second kind of simulation it's equal to the rate of change between the two price indices, the original and the replacement, hence it is time-varying: $\alpha_t^{cat} = \frac{Ip_t^{ref}}{UVI_t^{cmd}} - 1$. NB: For all other goods categories than the one considered (cat), the values of the vector are equal to 1, i.e. there is no changes from the actual trade balance for other goods categories.

- All variables are in percentage of the country's GDP, they are then converted to regional GDP and could be easily converted to world GDP or other denominator. The GDP is taken as the reference for comparison over time to follow standard practices and is taken as given in the simulation.

Economic counterfactual simulation:

$$
\begin{aligned}
&pcGDP_t^c = C_t \times pcGDP_t \\
&C_t = C_{s_0} \prod_{s=1}^{t} (1 + \beta G_s), \qquad C_{s_0} = 1, \ s_0 = 1962 \\
&G_t = \alpha_t tb_t
\end{aligned}
$$

- $G_t$ is the gains from the scenarios in year $t$ for a specific country. They are set to zero when negative.

- $C_t$ is the recursive adjusting coefficient of the GDP per capita. $\beta$ is the rate of return in terms of GDP per capita growth. It depends on the GDP per capita level of the country at times $s$. Following the values estimated in Bharti et al. (2025), it is equal to 20% for low income countries, 15% for middle income countries (10-20 000€ 2025), 10% for upper-middle and high income countries (20-50 000€ 2025) and 5% for very high income countries. Hence it might change through time for a given country if they change their income group because of the scenario or in reality. Note that $\beta$ is set to zero if the country's last year (2025) GDP per capita is above the high income ceiling (50 000€ 2025), then the previous year coefficient is applied. This allowed us to exclude high income countries, as defined by today's level, from the simulation and used them as references for other countries to catch up.

## 3 Global patterns of world trade specialization

Let's first consider the evolution of the composition of global exports along the period. The bulk of the increase in world trade in goods is of course due to the trade in manufactured goods, which represent 16% of GDP in value nowadays against 6% in the begining of the period. Primary commodities in the world GDP has increased from 4% in 1970 to 6% in 2025 while the postwar

globalization lead to an increase of world trade from 12% to 28% (Figure 1). The share of primary commodities in the global product in value is similar to services. The increase in the export of primary commodities has slightly accelerated with respect to world GDP growth but the share in all traded goods exports has declined.

Let's have in mind the global patterns of trade flows across world regions for this period. Looking at the world balance of trade in goods and services for all regions as a percentage of world GDP allow us to notice the change in the ranking of regions as global importers and exporters of each regions (Figure 14). First of all, it is clear from this figure that global imbalances in trade and services have increased as the share of world exports in world GDP has increased dramatically over this period, especially due to manufactured goods (see Figure 2). In the very beginning of the period North America and Oceania (NAO) was the main net provider of goods and services to the world while Europe was a net demander. The reversal started in the 1970-1980, with oil shocks. It was an unprecedented decade where MENA became the principal exporter with a surplus representing 0.5% of world GDP while Europe and NAO deficit represent at peaks around 0.3% of world GDP. And NAO slowly started changing towards becoming the major global net importer. After the 1980s, the international role of each region in the trade of goods and services started having their today's pattern. NAO has had a huge deficit to the world of about 0.9% of world GDP since the 2010s while there are two main exporters which are East Asia and Europe, and the MENA depending on oil prices variations. But this masks huge differences between commodity categories and moreover, using world GDP as a denominator hides the importance of the trade external sector for their own revenue.

Splitting the trade balance into services, manufactured goods and primary commodities allows us to acknowledge the relevance of the North-South divide in trade relations along this period even if it witnesses radical changes in manufacturing powers. The main exporter of manufactured goods used to be Europe until 1980 where the East Asia new manufacturing power increased its surplus to the world becoming the main provider of manufactured goods and represent 2.2% of World GDP in 2025 vs for Europe (0.5%), in Figure 9. Note that Europe's surplus deteriorated slightly but stayed at a similar level than in 1962 (0.7%). The rest of the world is a net importer of such products with a particularly high level of deficit for the NAO which continually widens to reach -1.6% of world GDP in 2025. There is an exception for South and South-East Asia which started to have a positive trade balance in the end of the 1990s even though it is very small as share of world GDP 0.1% in 2025. For this region, the rise in manufactured trade reached a peak in the 2000s where its surplus represented a substantial share of its GDP of 5% in 2001 (see Figure 4) to then plateau at a trend around 1% of its GDP. The peak could be an artifact of the 1997 Asian financial crisis but the manufactured export-led growth of some countries of the regions is not (Vietnam, Bangladesh). This shows the limits of the manufacturing development of this region which has not followed the path of China as volume exchanged had stopped increasing faster than world GDP (see Figure 3). This is not the focus of this study. Neither is the de-industrialization of North America and western Europe towards the rise of Asian manufacturing producers which reshuffled the North-South trade line. But, It is clear from manufactured goods, that a particular periphery, represented by Latin America, MENA and Sub-Saharan Africa has kept a similar role as net importer of manufactured goods along the period between -0.1% to -0.5% of world GDP. And it represents a significant share of their GDP, -9% for SSA, MENA and Russia and Central Asia and 6% for Latin America (Figure 4). These regions will be more relevant for the latter analysis on primary commodity trade.

World trade in primary commodities represents a significant part of SSA, MENA, Latin America and Russia and Central Asia revenue and is mainly provided by these regions in global trade, this is

the 'periphery' of interest in this paper. This geography is particularly relevant for fuel and mining products. And is perfectly represented by fuel (Figure 12) which world trade is dominated by these regions. A recent rise of NAO surplus in fuel products as a share of world GDP must be noted since the end of the 2010s. It is explained by the unconventional oil extraction technology which allows a dramatic rise in oil production in the US territory and partly explains the post-2014 fall in oil prices [1]. Note that their increase is understated by the simultaneous decline in fuel prices while for mining products it is mainly explained by a rise in prices. But as for mining products even if NAO took a major position in global trade it is a very small share of its revenue while it represents a significant share for the periphery's. NAO became the second biggest surplus in the end of the 2000s until taking the first place in the 2020s [2] with a share in world GDP between 0.1% in 2010 to 0.16% in 2025 against 0.2% and 0.1% for Latin America, respectively (Figure 13). But the share of this surplus in their GDP is of 0.5% since 2010, while for SSA it is 4% in 2025, 3% for Russia and Central Asia and 2.2% in 2010-2025 for Latin America (Figure 8). For agricultural products, this depiction is more stringent for the first half of the period (Figure 6). The trade surplus in agricultural products represented about 5.5% of SSA GDP in 1962-1970, 3% of South and South-East Asia and Latin American GDP in 1970-1980. While this share has fallen for all countries until below 1% (explained by the demographic boom in the global South) it has risen for Latin America since the 2000s and is now 3.2% of their GDP. The latter is mainly explained by the ascent of the Brazilian agricultural sector. From a world perspective, NOA was the biggest surplus from 1962 until the 2000s when the Latin American agricultural exporting sector took off.

Therefore, looking at the balance of trade gives insights on the specialization in the net exports of primary commodities of the Global South from a world perspective but most importantly from the perspective of their own economy and in monetary value along 1962-2025. North America and Oceania (NAO) is also a major net exporter of certain primary commodities. However, this trade surplus does not represent a significant part of their GDP. Besides, it points out the limits of analysing at a high level of aggregation. Indeed, within each broad category of commodities (agricultural, mining, and fuel products) there are important heterogeneity in prices of products. These differences which may reflect bargaining power and asymmetrical technology diffusion are ignored from the present analysis. Yet, this paper contributes to highlighting implications of changes in relative prices of primary commodities, already relevant at high levels of aggregation, for a specific global South. And the main channel selected to directly investigate the impact on balance of payment and GDP per capita is the mechanical change in the net trade balance.

# 4 Price - volume decomposition

The constructed world price indices allow us to compare the evolution of the different categories of commodities, their relative prices and to decompose the evolution of the value of world exports of each commodities into a volume and price component.

The first result in Figure 15 is that the cumulated changes in prices of most traded goods are pretty similar for the selected period. Agricultural product prices and manufactured goods prices follow a close evolution, agricultural increase even slightly more. Mining product prices also follow the

[1] This has mixed evidence, most of the decline can as well be caused by the decline in world demand (Prest, 2018).

[2] Mainly caused by the rise in the price of metals and particularly of precious metals (silver and platinum as gold is excluded from the data. This points out a limit of the high heterogeneity in this wide category of products and particularly in prices.

manufactured goods price even though it is a bit slower and features more variations. Overall, they increased from 1962 to 2025 by about 500%. The price of fuel products however has increased in another scale and leads in the average primary product prices to be in a sharp increasing trend compared to manufactured goods. These price indices allow a broad comparison that matches the coverage of the WBOP and is based on more products than the 45 quoted prices databases (Gruss & Kebhaj, 2019). But it is important to stress that these price indices don't aim at invalidating nor validating the PSH, as the trend in goods is very dependent on the selected time period. The first observation that can be done at this stage is the spectacular relative price increase in fuel prices.

Now, this world prices index can deflate the world exports cumulated increase over the period, in order to obtain the volume index. It breakdowns the evolution in trade value between a price and volume component. All goods can be compared in Figures 19, 20, 21, 22. The increase in the value of exports in agriculture is due to both a volume and price effect which are pretty close until the 2000s. After, the increase in volume exchanged was not followed by a similar increase in the price index. If we assume that the cost of production in agriculture hasn't decreased significantly after the 2000s, it can be said that the terms of exchange of agricultural products has decreased with respect to previous years. The value accrued to exporting countries per quantity unit exchange has increased as shown by the price index but volume exchanged increased faster hence the gains from the increasing volume exchanged has worsened.

For manufactured goods, the increase in the value exchanged is mostly explained by the increase in the volume. This is mainly due to the dramatic increase in technical progress in the manufactured sector during this period which lowered the cost of production. However, it can be noted, in relation to the unequal exchange discussion, that the lowering cost of production can also be attributed to the shift of the manufactured powers to the low wages East Asia countries. Then this spectacular difference between the increase in volume and in prices (see Figure 22) can partly reflect a change in the bargaining power of manufactured goods producers along the North-South power relation.

The most interesting result for the later comparison with fuel is the decomposition of the evolution of mining product values. In Figure 21, mining product volume decomposition resembles the manufactured goods chart: volume increased by 2650% while their prices only by 500% (vs 700% for GDP price index). But it is highly unlikely that the technical progress of manufactured goods are comparable to those witnessed by mining products during this period. Hence, it can be said that mining products as opposed to fuel products has seen its price increase slower than the increase in volume exchanged which imply a deterioration of the relative value accrued to the exporters. The Figure 20 for fuel exports presents the reverse phenomenon, as it will be argued below, it shows the bargaining power of fuel exporting countries has succeeded in extracting values from the trade of these commodities.

To summarize this findings, Figure 3 plot the composition of global exports of goods and services in proportion of the world GDP in volume [1]. This shows that the increase in the volume exchanged in agricultural, fuel, and mining products followed roughly the increase in world GDP. The bulk of the increase in the magnitude of world exports as a percentage of world GDP in volume is due to manufactured goods. While primary commodities stay mainly constant. It reaffirms their constant role in fueling the world economic growth with a stable complementary input to output ratio in the global production. Fuel share showed slight decrease after the 1980s. It could be explained by the

[1] As Nievas and Piketty (2025) notes, using world GDP is a common practice but it overestimate the magnitude of total exports even more until the post-90s so called second globalization which saw a rise in intermediate input trade.

increase in the energy efficiency of production triggered by the 1970s oil shock [1]. Mining products are also slightly increasing. As the relationship between economic growth and demographic growth remained stable during the period, the increase in agricultural products exported (which include food) has remained stable as a proportion to GDP. Mining products has been taking a growing importance in global trade.

As the analysis will draw comparisons between these primary commodities it is critical to present their similarities and

# 5 Results of simulations

## 5.1 Foreign wealth accumulation

Let's focus on the comparative evolution of foreign wealth accumulation. It can be represented by the NFA series in proportion of countries and regional GDP, to compare the different paths of foreign asset accumulation of each region rather than their relative levels. It can also be considered a measure of the evolution of the importance of the foreign sector with respect to the regional economies rather than describing the position of the region in the world economy.

It is important first to have in mind the actual evolutions. Middle East and North Africa (MENA) show a dramatic increase from a slightly indebted position to the world in 1970 to a positive net foreign asset stock at about +75% of its GDP in 2025. It has the highest share of NFA in its GDP for almost the whole period (see Figure 23). Note however, that its relatively small GDP in the global economy leads to a more moderate share in world GDP (+3%, see Figure 28). Their high cumulated surplus in fuel trade (see Figure 7) of above 10% of their GDP for the whole period allows them to accumulate claims over the world as opposed to other low or middle income countries. Indeed, Sub-Saharan Africa, South and South-East Asia and Latin America regions, while important mining and agricultural exporters (see Figure 8 and Figure 6), almost never have a positive NFA along this period. Moreover, since the beginning of the 21st century their international indebtedness position has taken an increasing share in their GDP, of -42%, -10% and -30%, respectively in 2025.

Let's recall the specificity of the oil price determination along this period, which highly explains the NFA of the MENA. The creation of the OPEC in 1960, an organization of petroleum exporting countries, is a major shift in bargaining power from multinational oil companies (especially the well known seven sisters vertically and horizontally controlling the market) to the states. As shown by Figure 47, the oil shock of October 1973, triggered by the organization, increased the relative price of fuel with respect to other primary commodities of 130% in one year. This shift is explained by the rapid increase in oil demand between 1965-1973, the concentration of petroleum product production and known reserves in non-align countries (especially MENA), the choice of these states to stop granting new concession to multinationals and claim equity participation in the existing ones, some nationalization experiences and cooperation to unilaterally set crude oil prices. Therefore, it is an interesting experience as it results mostly from changes in the market organization from vertically and horizontally integrated western multinational companies to unionize recently independent states.

[1] It could also be a sign of overvaluation of the fuel price index due to a biased aggregation of unit value growth rate between 5-digit fuel products code towards oil and petroleum products. Yet, note that the co-movement of energy products is also expected.

The first simulation show the evolution of net foreign asset position of world regions in the case price of traded fuel products would have followed the actual GDP price index. The latter is a good average of the cumulated increase in prices of all goods and services in the world since 1962. Hence, this scenario is equivalent to neutralizing the specific price effect of fuel. The results presented in Figure 24 are clear, the NFA position of MENA, Russia and Central Asia more than reversed, there are indebted and the share of the external debt in their GDP increased linearly to reach -377% and -300% respectively. Meanwhile, the NFA stock of Sub-Saharan Africa would also substantially deteriorate until -226% of its GDP. This illustrates straightforwardly the decisive implication of the particular structure of the global fuel market in transferring values from the global North to the South. It is a very particular historical experience as the role of oil price as a counter power in North-South relation has deteriorated since then in particular since the widespread deployment of unconventional oil production technologies which dramatically rose the US supply capacity in the previous decade (Arezki & Matsumoto, 2017). It is well established that the 1973 oil shock is the result of the OPEC supply restriction policy. The power of the OPEC to set prices has then varied widely and mostly decline overtime (Fattouh & Mahadeva, 2013), yet it is still a benchmark example of changes in the North-South power relation in the primary commodity markets. Hence, after having envisioned the implication of such experience in the patterns of foreign wealth accumulation it is interesting to ask the opposite question: What would have happen if mining an agricultural exporting countries, would have organized similarly?

Even if Agricultural products and mining products are very essential inputs in the global production they have many differences with fuel products. First of all, the North-South divide in the concentration of agricultural products exports is less obvious than for fuel. North America and Oceania was a great agricultural exporter during the whole period. Still, relative to their own economy the specialization in agricultural products is still an important feature of developing countries in this post-colonial period (see Figure 6). It is particularly true for Latin America, South and South-East Asia as well as Sub-Saharan Africa for the beginning of the period. For mining products the North-South geography of their extraction during the post-1960 period is even clearer. Another kind of difference lies in the production technology, the production of these commodities is less concentrated (especially for point-source minerals and agriculture products). Besides, most of these resources are non-renewable hence they share a fundamental feature, they imply scarcity-rent premium. This feature may intrinsically justify a tendency to a non competitive market structure. But the main objective of this study is not to explain why mining or agricultural producer haven't organized as the OPEC since many obvious obstacle exists. Notwithstanding, it is to use this example to envision credible alternative paths of commodity prices, which would result from a change in the bargaining power of primary commodity exporting states.

The simulation for agricultural product prices show a dramatic increase in the positive NFA position of Latin America, South and South-East Asia and Sub-Saharan Africa (Figure 26). Sub-Saharan Africa and Latin America replaced MENA in the path of foreign wealth accumulation. Indeed, for the latter the international investment position path has totally reversed, its external debt reaches -450% of its GDP in 2025. Small changes, an increase of 40% in the relative price of agricultural products, constant for the whole period, does not substantially change the foreign wealth patterns (Figure 32). But it still allows Latin America and South and South-East Asia to reach a positive net foreign wealth in 2025 of about 10% and 6% of their GDP respectively, while it is negative in reality.

The simulation on mining product prices show a spectacular improvement of extractive industry exporters which are also low income and middle income regions (Figure 27). Sub-Saharan Africa

reaches a NFA of 1400% of its GDP in 2025. The comparison with fuel prices seems particularly relevant for the Sub-Saharan Africa case. Other simulations with a small fixed increase in relative prices of mining products (+40%) is enough for for SSA to own a positive foreign wealth in 2025 (Figure 36). Note, that this kind of increase would be of the scale of market exchange rate adjustment to its PPP value in line with the unequal exchange literature (Nievas & Piketty, 2025). However, it is important to remember that the framework of unequal exchange discussions is slightly different from this paper. The unequal exchange approach looks at differences in prices across Core and Periphery for similar goods which outspan productivity differences (Hickel et al., 2021) and can be due to undervaluation of peripheral countries currencies. Hence, it is also related to the Penn effect, an empirical relation which states that countries price index are correlated with their income per capita. The counterfactual world depicted by the last cited paper where purchasing power parity would perfectly hold and peripheral countries' LCU wouldn't be undervalued does not correspond exactly to the scenario of constant change in relative prices of a primary commodity. Such scenario would need to change the relative price of country-specific prices of a commodity. In this paper, prices are international and it is the relative prices of commodity categories that is changed. Still, it is a relevant benchmark of order of magnitude of changes in prices discussed in the literature and due to the specialization of trade across regions is comparable to this study.

### 5.2 Comparative development

Even though the NFA series gives an insight on the financial sustainability of development paths of global South regions as well as a certain measure of wealth extracted from the participation in globalization they also omit important aspects of it. Indeed, the first kind of simulation entails less assumptions but doesn't feature any proper economic mechanism which might be at play in the development path of world regions in the case of a change in relative prices of commodities. In particular, it is assumed here that all gains from the relative price increase would be invested in the human capital of the domestic economy. This assumption ignores discussions about political economics issues of natural resources management and its capture which can lead to unproductive investment like for sovereign wealth funds (Bernstein, Lerner, & Schoar, 2013) and more specific natural resources curses institutional channels (Alssadek & Benhin, 2023). Beyond these considerations, the construction of this counterfactual is an extreme opposite case to the financial simulation. All gains are invested to close the gap in public education and health care investment with rich countries. As explained above, a recent study provides estimates of the rate of returns of these kinds of investment in terms of GDP per capita growth which are included in the simulation. Finally, another difference with the previous simulation is that non-benefiting countries (net importers of the considered commodity) or rich countries at the end of period are almost unaffected. Losers are assumed to entirely absorb the additional deficit through consumption cuts which doesn't change their productivity path. Hence, contrary to financial simulations it does not feature symmetric effects.

Note that these results are sensitive to the starting period and the reference year of the indices. The choice of the reference year determines the starting point of the cumulation of relative price changes between commodities, it set the relative price to 1 at this year. As the relative prices of fuel with other commodities is decreasing for some years before 1970 (Figure 47) the growth paths are less explicitly increasing. For the sake of illustrating the spirit of the scenario which is that the price of agriculture or mining products would increase as much as if they were organized by a similar institution as the OPEC I prefer showing the post-1970 simulations. Other simulations with

price indices taking 1962 as the reference year can be found in Appendix B.4 (Figure 48 and 49).

Before presenting the results of the simulation it is useful to have in mind the actual paths of GDP per capita growth in PPP terms (to compare standards of living across countries) in 2025 euros (Figure 39). The world GDP per capita increased moderately from 5 000€ to 16 500€ but with great disparities. The North American and Oceania region and Europe started the period at higher levels and increased at a similar trend which is higher than the world average. Europe increased its GDP per capita from 11 600 to 42 500 which gives a rate of increase of 266% for the entire period while the world aggregate increased at a rate of 230% . Hence it can be said that for this relatively small period, there is more evidence of divergence than convergence. However, East Asia is an exception and shows an increasing trend since the 1980s and accelerated since the 2000s which lead to an increase from 1970 to 2025 by 788% of its GDP per capita. A second group of countries are the regions at the level of middle income countries. Russia and Central Asia, Latin America and MENA follow the world trend. The last group of regions are of low income countries, Sub-Saharan Africa almost stagnated and is below 5 000€ while South and South-East Asia show a faster increasing trend than the world since the 2000s but stays below 10 000€.

The scenario investigated here are the two already presented before, that mining products or agricultural products would follow fuel prices. For agricultural products (Figure 40) the result is particularly striking for Latin America. Its living standards would be in the range of high income countries at the end of the period (34 000€) it more than doubled compared to its level in reality (15 000€) and the gap with European GDP per capita would shrink. Another interesting path is the one of South and South-East Asia, it's GDP per capita path would closely follow the spectacular path of East Asia. For Sub-Saharan Africa, the level will double compared to reality reaching 10 000€ in 2025 but it is a path that continues diverging from the rest of the world. In the case of a small increase (40% in Figure 42) in the relative price of agricultural products for the whole period the per capita income growth path is unchanged. Even a tripling in the relative price (Figure 43) would not trigger a significant convergence of standards of livings. Although, Latin America would have a better path that reach 25 000€ in 2025 (an increase of 66% compared to reality). Note that a tripling for the entire period is lower than what happened with fuel (Figure 25).

The simulation for mining products gives a spectacular path of growth for Sub-Saharan Africa, together with MENA and Latin America they arrive at high-income country levels, 32 000€ (see Figure 41. Russia and Central Asia even reach the European level. Overall, this scenario proposes a closer path to convergence. East Asia and South and South-East Asia however are almost unaffected by this scenario. This is simply due to the geography of mining product extraction. To conclude, this last result reaffirms the clear North-South divide in the trade in mining products. This is the category of goods for which better terms of trade discussion is more relevant. It seems that higher relative prices for mining products has a clear effect in alleviating world differences in living standards. However, small increases in fixed relative prices of mining products for this period are not enough to disrupt the path of divergence of Sub-Saharan Africa. It is only for an increase of 400% of mining product prices leaving all other prices unchanged that the Sub-Saharan Africa region starts converging to middle income levels. This means the counterfactual is a world with price of mining products 5 times higher than what they were along this period (see Figures 44, 45 and 46). Therefore, even with the assumption, which can be thought of as upper bound, of 100% of gains in trade surplus invested in domestic human capital, only a very high increase (though historically credible) in relative prices of mining products has a significant impact on standards of living's growth path for this short time span. The main takeaway is the interesting comparison between fuel and mining products. With the outlook of a continued extractive path of green transition, the

role of mining products in the global production could be emphasized, together with the relevance of the discussion on alternative trade organization as a mean to achieve world development and equality goals.

# 6 Discussion

First of all, in the actual world there is a difference between the global price of a commodity and the negotiated value added accruing to extracting countries. This value is obviously related to the bargaining power of the producing countries given the global demand as well as the quality of the commodity. Indeed, a refined product has a higher price. The development of the refinement sector is a common industrialization strategy of extractive countries. This is the heart of the justification of the 2014 Indonesian export-ban on nickel and bauxite. This leads to an increase in the price of their exported commodities. This strategy requires a high concentration of this rare commodity in the same country to have a significant bargaining power to leverage upon [1]. Hence, this industrial policy attempts to increase the revenue collected by the country from the exploitation of these resources without necessarily increasing the global price of the commodity but by increasing the quality of the good exported. At our level of aggregation this would increase the price of Indonesia mining products. Whereas fo the oil shocks example, the end of foreign concession or even nationalization together with the coalition of exporting States increased both revenue and global prices of oil. This case points out more precisely the discussion regarding prices evolution unrelated to productivity and quality. The interesting development policy debate on how a country could climb up the value added ladder and industrialize is out of the scope of this analysis.

This relates to a major limitation of this study: the commodity aggregation level. Indeed, within the broad commodity categories used in this paper, there are high heterogeneity of quality and prices of products which can be correlated to the export country income level. But the global prices are average unit value weighted by the share of the basic heading export value in the global market in the preceding year. However, these weights are different for a country, and its change can reflect a quality upgrading and an industrialization of the country. Hence applying the same global prices to all countries isolate this effect suggested in the previous paragraph. But this commodity aggregation might also mask disparities that is of interest for this discussion. Let's take the spectacular increase in the share of the trade balance of the NAOC region in world GDP in figure 13. It can be attributed to the Australian iron whose price and exports has increased substantially since the 2000s. It is also due to the USA and Canadian aluminum, dolomites from the Netherlands and the Nickel from the USA. While for Sub-Saharan Africa the basket of products whose countries are net exporters are very different. Even if South Africa exports in nickel has increased even more than the USA, manganese is much more exported by SSAF (South Africa and Gabon mainly) whose prices increased less. When applying the world price index of mining products weighted with the share of each 5-digit products in the world exports instead of the share in the region exports, the price of mining products might be overestimated for the SSAF for example. Hence, in this case our counterfactual might be underestimating the effect of an increase in relative prices. And at the same time precisely missing the different bargaining power of the exporting countries.

To better contribute to the unequal exchange theory literature, it may be interesting to construct a counterfactual correcting the Penn effect. It is the empirical observation that aggregate price indexes

[1] In the case of Indonesia importer of bauxite or aluminum could easily find alternative sourcing countries which lowered the effect of the ban as opposed to nickel, see Bosker, van den Herik, Pelzl, and Poelhekke (2025)

are positively correlated to per-capita income across countries. It is at the heart of the estimation of purchasing power parity. And is the main factor which drives the gap between market exchange rate and PPP exchange rate which is the key to estimate the transfer of value in the unequal exchange literature (Hickel et al. (2021), Nievas and Piketty (2025)). Another factor would be regarding the international monetary system and the dominance of some currencies (Dollar and Euro for the studied period). The Penn effect is interesting as it could also entail aspects of asymmetric bargaining power between developed and underdeveloped countries in their trade relation. Balassa and Samuelson separately explained it by differences in productivity in the trade sector which are then spread to non-traded sectors. In their explanation the differences in prices of non-traded goods across countries does not come directly from productivity differences in the production of these particular goods. Hence even within this framework trade (as traded goods include non-traded sector inputs) allows developed countries to benefit from better terms of trade. A possible extension of this paper would be to construct country-specific price indices per commodities or just detailing the counterfactual to allow for country-specific changes in prices of commodities. This would give an order of magnitude of the impact of this stylized fact which has been precisely observed by Hassan (2016).

Also, it can be noted that the simulations include channels of the Natural Resource Curse literature. When assuming that all gains are invested in foreign assets or in domestic human capital it directly assumes many institutional and political economy channels of the NRC literature are also corrected for, see Ploeg (2011). For the investment in domestic human capital it assumes no proceeds would be appropriated by a foreign company which would invest elsewhere. Hence, these simulations do not isolate the effect of changes in international relative prices of commodities from those of removing a specific other NRC channel. This paper considers both effects - the international price and the domestic institutional effect - together. These scenarios can then be thought of as *upper bounds* in each extreme, foreign asset or domestic economy investment. It can be argued that it is a change in the organization of primary commodity trade which could be close to the one of the OPEC, states that partly or entirely nationalized the production and management of their petroleum resources. Still, the mismanagement of nationalized windfalls highlighted by the NRC could still be at play. However, as already discussed in the introduction, the credibility of econometrics analysis of the role of these institutional factors in the growth path of natural resources producers is challenged by important endogeneity issues. It is important to stress that this paper does not advocate for resource led growth strategies. Nor has it the ambition to discuss precisely domestic policy debate in resource-rich developing countries. It does not understate the role of domestic policy and especially development strategy. But, the point is from a global and historical perspective to en-light the *size* of the role of bargaining power of global South regions in primary commodity markets, beyond their cycles and volatility, in the development path of their countries. Hence, it is interesting to ignore domestic policy matters for the sake of illustration. Notwithstanding, it could be interesting to construct *lower bounds* estimates by assuming lower than 100% shares of gains which would be invested in foreign assets or domestic long-term assets (such as human capital) relying on actual observed shares in the case of petroleum products. This would be equivalent to assuming a lower yield of investments as the non-invested share would be entirely consumed and would have no rate of return in terms income per capita.

Furthermore, it is important to underscore that the presented simulations doesn't take into account any general equilibrium and dynamic channels. Even if it is calculated for every year, the underlying model is static. Many economic mechanisms are ignored and would substantially reduce the gains. In particular, the demand for each primary commodity is assumed to be perfectly inelastic which implies no changes in the quantity consumed subsequent to the sharp rise in prices of commodities.

This is unrealistic in the long-run as the decrease in the intensity of a commodity in the production might be triggered or accelerated by higher prices and the elasticity of demand might be higher after the shock (see the case of oil Caldara, Cavallo, and Iacoviello (2019)). The demand for other goods is also assumed to be exogenous. It is sensible as the counterfactual represents the isolated effect of an increase in the bargaining power of primary commodity exporter that takes a higher share of revenue as compared to the actual world. It is not a demand nor a supply shock. Including these mechanism in our counterfactual would just generate inflation.

Another important hypothesis of the 'economic simulation' is that productivity gains and subsequent revenue are entirely devoted to domestic production and doesn't change the structure of the demand in goods of the country. The elasticity of the demand in goods to income is inelastic and the gains are considered in a closed economy perspectives, the growth of other countries is not driven by productivity gains of partners and the other trade balances of each countries are unchanged. However, these estimates would be highly speculative and would not increase the credibility of the counterfactual. There is a trade-off in adding more assumptions to expect enlarging the scope of economic mechanisms taken into account and improving the credibility of the counterfactual. The aim of this paper is not to provide a highly credible counterfactual nor to account for many mechanisms but giving insights on the magnitudes and implications of different price scenarios on the narrow channel of investment of gains in international financial market or on human capital in the domestic economy. It gives some figures but including other channels would not increase the credibility of the simulation and might confound the effect that is of interest in this analysis. Nonetheless, it must be highlighted that real economic mechanisms would lead to feedback and a complete different picture which might probably lower the gains in terms of per capita growth or international investment position.

Further research could focus on constructing prices of different categories of services and manufactured goods and investigate the potential shift in bargaining power from manufactured goods exporters to services exporters as manufactured production relocated in East Asia during the post-1970 period. Trying to disentangle from the decrease in production cost of manufactured goods the part attributed to technological progress and from lower wages.

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*ronmental Change*, *73*, 102467. Retrieved from https://www.sciencedirect.com/science/article/pii/S095937802200005X doi: https://doi.org/10.1016/j.gloenvcha.2022.102467

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# A Data

**Downloaded from UN Comtrade** This download is done trough API queries in an R program available in the replication package.

- 1962-1999: I download at the year x reporter x flow x 5 digit commodity code at the SITC rev. 1 classification (S1).
- 2000-2009: The available classification is the SITC rev. 3 (S3). So I convert the codes to the S1 using a conversion table and aggregate if needed.
- 2010-2023: The classification for this period is SITC rev. 4 (S4). I convert it to S1 and in the case I have S4 code associated to multiple S1 codes I equally split their quantities and trade value. 2024 is still too recent to have a satisfying country coverage.

*5-digit commodity codes*: actually some codes are 4-digit, because they had no corresponding 5-digit codes so they were also added to the query list. An improvment could be to check if country-year coverage is improved for oil products if the product code is at the 3-digit level as it is pointed out by Gruss and Kebhaj (2019).

*quantity unit selection:* when multiple quantity units were reported for one level, I choose the first nonzero reported quantity in the following order of preferences : net weight, quantity, alternative quantity. An alterative method would be to keep the 3 columns (quantity, net weight and alternative quantity) and at the end choose the best according to the largest time stability.

*multiple quantity units* Due to classification conversion, I have multiple quantity units for a given elementary level. In this case I take the UV of the main quantity (the most frequent one for this level for the whole period) unit to extrapolate the value of these quantities relying on their trade value.

*Main issue*: the main issue is the heterogeneous time coverage (not all product x reporter exist for every year) and the change in the quantity unit reported at the elementary level.

**Final database**: I have a database of trade value, quantities and quantity units at the year x reporter x flow x 5-digit commodity code level x quantity units for the 1962-2023 period. I split it in 3 product groups: the agricultural products, fuel and mining products and manufacturing products for computing efficiency.

**UV outlier detection algorithm** I follow an OECD Working paper (Miao & Wagner, 2022): which calculate export and import UVI at the world level for 10 years (2011-2020), note that their elementary level also include partner dimension (bilateral trade) I don't.

- Step 1: UV ($\frac{v}{q}$) are calculated at the year x reporter x quantity units x 5d and compared within the corresponding 4-digit x quantity unit x year strata. When there are more than 100 observations within a strata, I apply the asymmetric fence method (AFM) to determine outliers and for groups less than 100 I use the revised meand absolute deviation (MAD) criteria.

- Step 2: year-on-year changes of unit values at the elementary level $yony \in [0.2, 10]$. This rule is not applied to rows which correspond to more than 10% of the total trade of their 4d groups of more than 10 observations.
- Step 3: year-on-year changes, cross country comparison. It's like step 1 but now the AFM and MAD is applied to the year-on-year growth rate of unit values. The strata, the level of comparison is still 4d x quantity unit x year. Hence it pools all countries together.

**Price-volume decomposition** inspired by IMF's new database (Gruss & Kebhaj, 2019) and the UNCTAD UVI database

- **International prices of agriculture, fuel, mining and manufactured goods in exports and imports**: Rellying on unit values (UV) at the 5digit product level we approximate the international price of these categories of goods (agricultural, fuel, mining, and manufactured) in exports or imports.

  The weights are the observation trade in the total trade (X or M) of the commodity category in the previous year (Laspeyre of prices). UV are calculated at the elementary level: year x reporter x flow x 5-digit x quantity unit but I take the geometric mean of their year-on-year changes at the year x commodity category x flow_code level as follows:

$$UVI_t^f = exp\left[\sum_i^{nf} \log\left(\frac{uv_{it}}{uv_{it-1}}\right)\frac{v_{it-1}}{\sum_j^{nf} v_{jt-1}}\right]$$

  Chained:

$$UVI^f_{t,(1962=100)} = \prod_s^t UVI_s^f$$

  - $i$ is an elementary level observation in the group of size $nf$ which shares same year x flow_code x cmd_cat (Agri, fuel, manuf).
  - $f$ is the flow_code which is either X or M, it's omitted because included in the $i$ index.
  - $k$ is the commodity category (Agri, fuel, manuf) because included in the $i$ index.
  - $v_{it}$ is the trade value of observation $i$ at year $t$.
  - $uv_{it}$ is the unit value of $i$ at year $t$. it's $\frac{v_{it}}{q_{it}}$ with $q_{it}$ the quantity of product in $i$.

  Nota Bene: For many year x reporter x flow x 5-digit x quantity unit, a growth rate of the calculate unit value couldn't be derived since the last year's UV was missing or was of a different quantity unit. For gaps of less than 5 years we linearly **interpolate** the missing UV growth rates at the elementary level. Growth rate is the only indicator that can be compared between different quantity units. Hence, we do not interpolate UV in levels, but the yearly growth rate of the UV.

- **Volume index** Let's deflate the world trade value index by the international price index. First let's calculate the value index, the cumulated change in trade values:

$$gr_val_t^{c,f} = \frac{v_t^{c,f}}{v_{t-1}^{c,f}}$$

Then chained it:

$$VAL^{cf}_{t,(1962=100)} = \prod_{s}^{t} gr_val^{c,f}_{s}$$

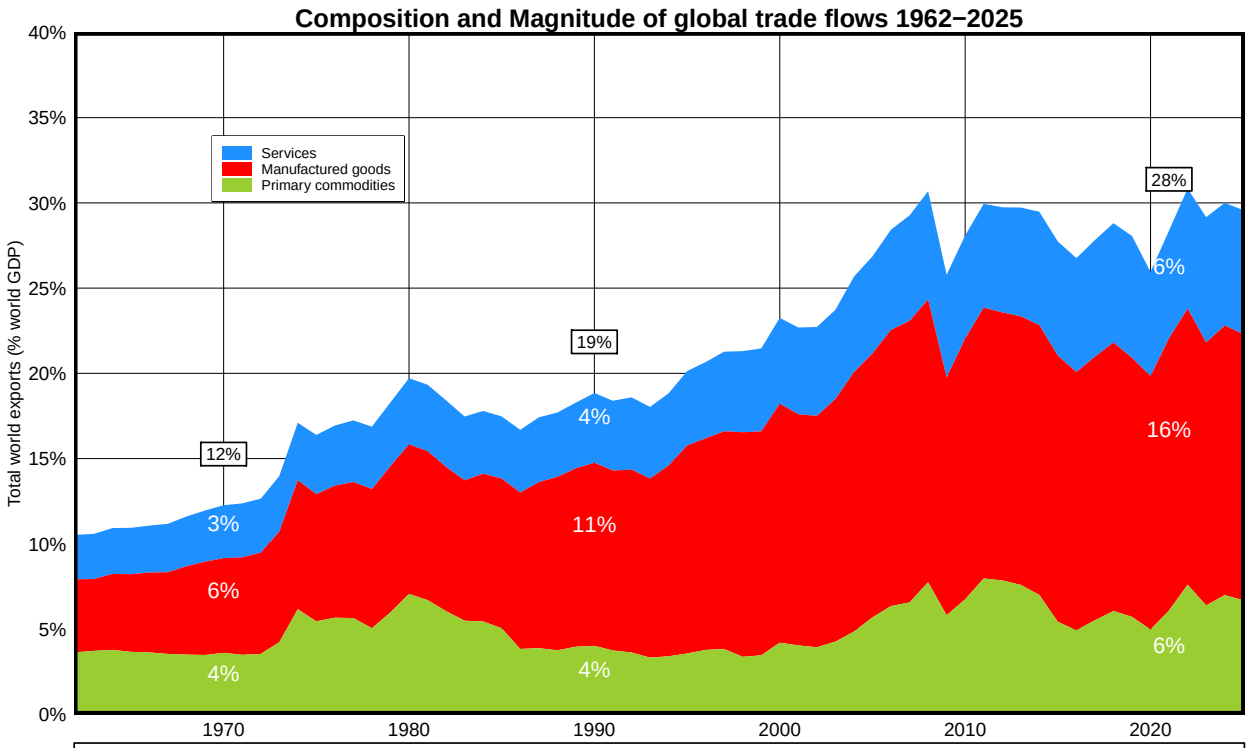
$$VOL^{cf}_{t,(1962=100)} = 100 \times \frac{VAL^{cf}_{t,(1962=100)}}{UVI^{f}_{t,(1962=100)}}$$

- **Different level of aggregation**: calculate UVI over different pool of data. For example, for the export UVI over all traded goods, the growth rate of unit value is calculated at the elementary level. The yearly average is then calculated over all goods and the weights are the share of each observation in world exports of the specified category.

# B Figures

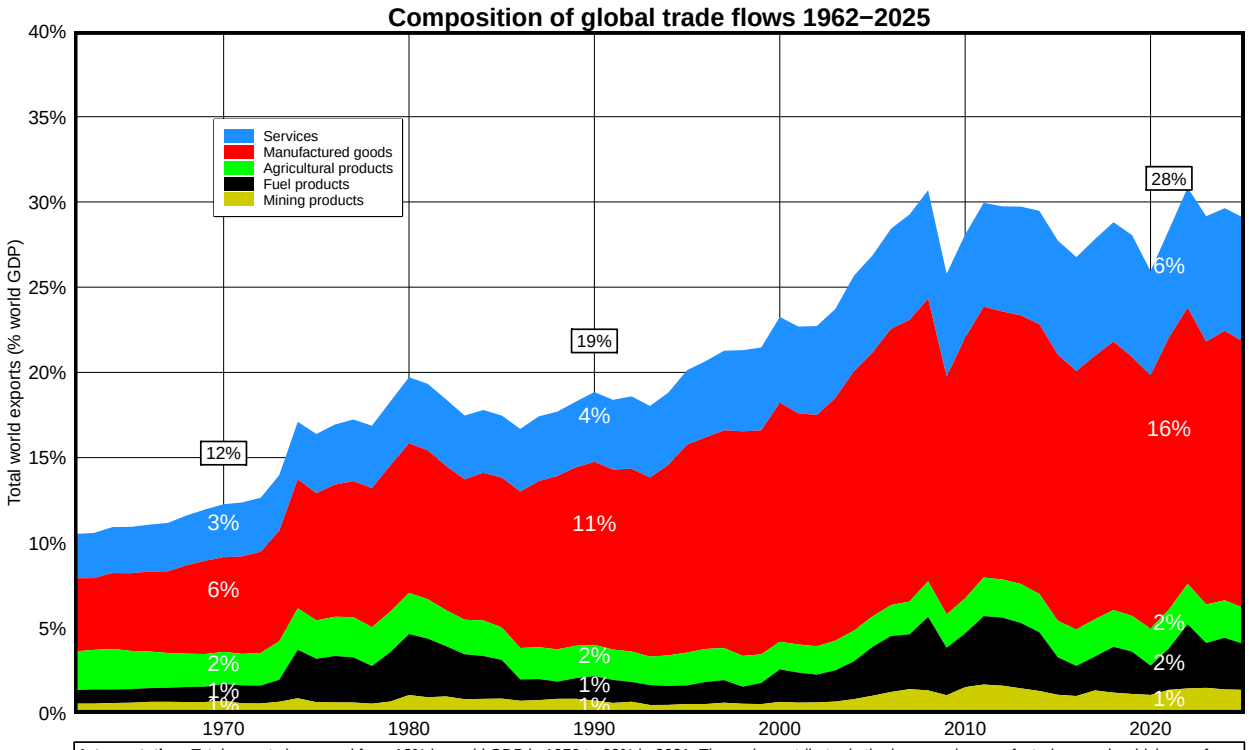
## B.1 Global trade patterns

**Figure 1**



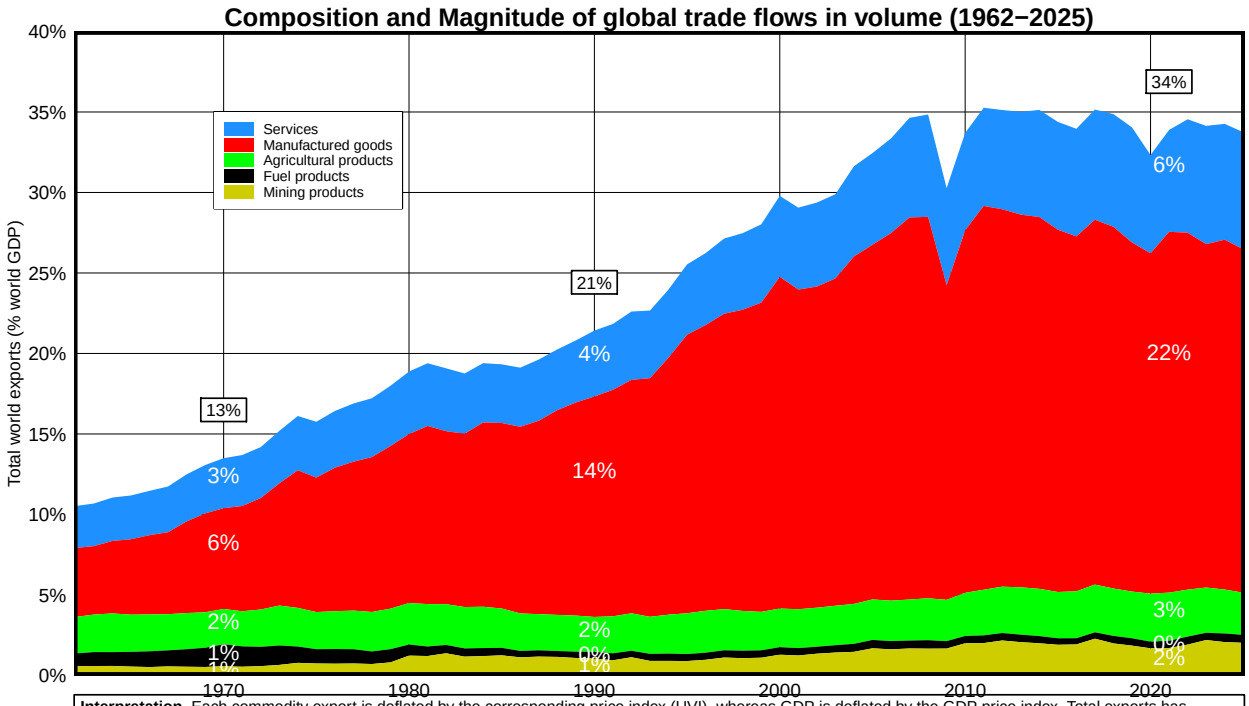

**Interpretation**. The share of global trade in world GDP has stagnated since the Great Recession to 28% after a long period of rise from 12% in 1970. This rise is mainly due to the increase in Manufacturing good trade which share in world GDP almost triple and Service which doubled. **Sources and Series**. see wbop.world.

**Figure 2**




**Interpretation**. Total exports increased from 12% in world GDP in 1970 to 28% in 2021. The main contributor is the increase in manufacturing goods which rose from 6% to 16%. While the trade in primary commodities followed closely the increase in world GDP. Unless, for the two steep rise in oil prices of the 1970s and 2000s.

**Figure 3**




**Interpretation**. Each commodity export is deflated by the corresponding price index (UVI), whereas GDP is deflated by the GDP price index. Total exports has reached 34% of world GDP in 2021 (vs 28% in value). The share of primary commodities stayed stable for the period, it followed the increase in the GDP, its share in volume (5%) is close to its share in value (6%). The share of manufacturing goods expanded even more in volume (22% vs 16% in value). **Note**. As there is no price index of trade in services, the share of services exported are in values. Each primary commodities is deflated by its own price, hence the total share of primary commodity is different.

**Figure 4**

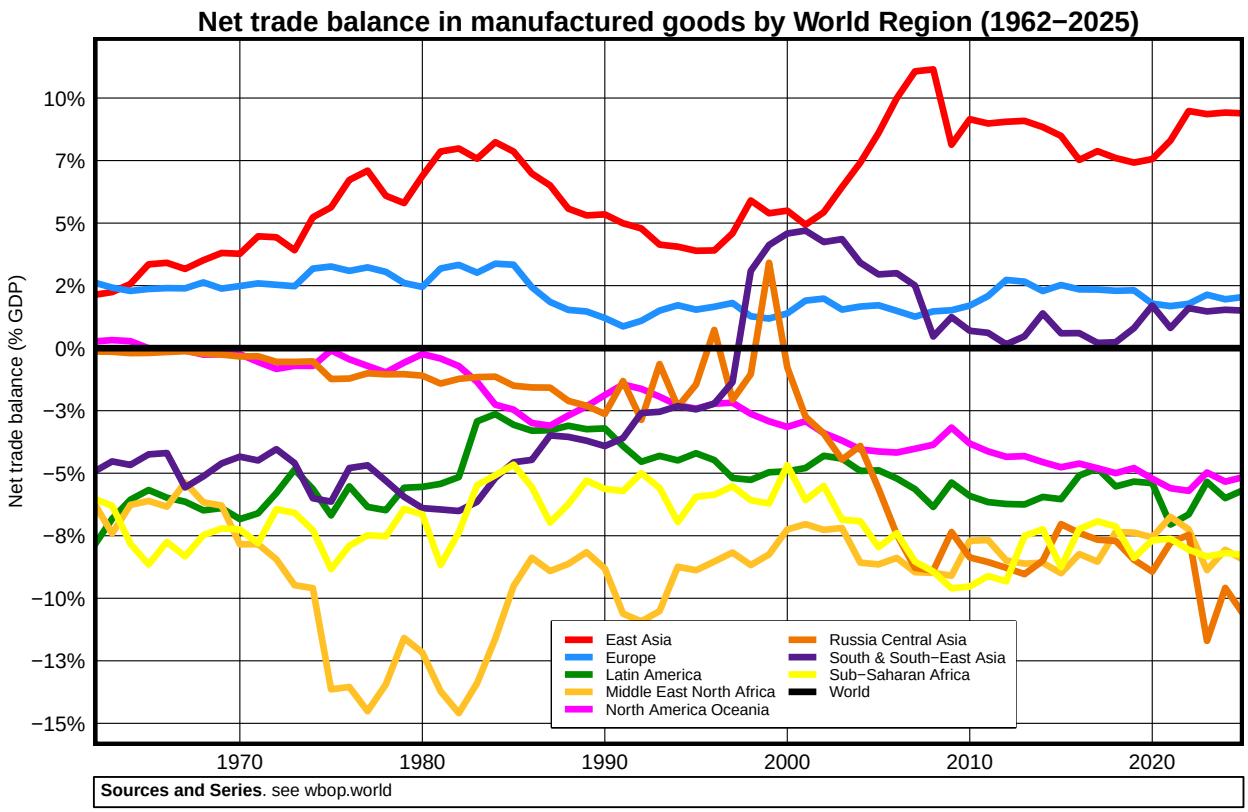

Net trade balance in manufactured goods by World Region (1962−2025)
Net trade balance (% GDP)
10%
7%
5%
2%
0%
−3%
−5%
−8%
−10%
−13%
−15%
1970
1980
1990
2000
2010
2020
East Asia
Europe
Latin America
Middle East North Africa
North America Oceania
Russia Central Asia
South & South−East Asia
Sub−Saharan Africa
World
Sources and Series. see wbop.world

**Figure 5**

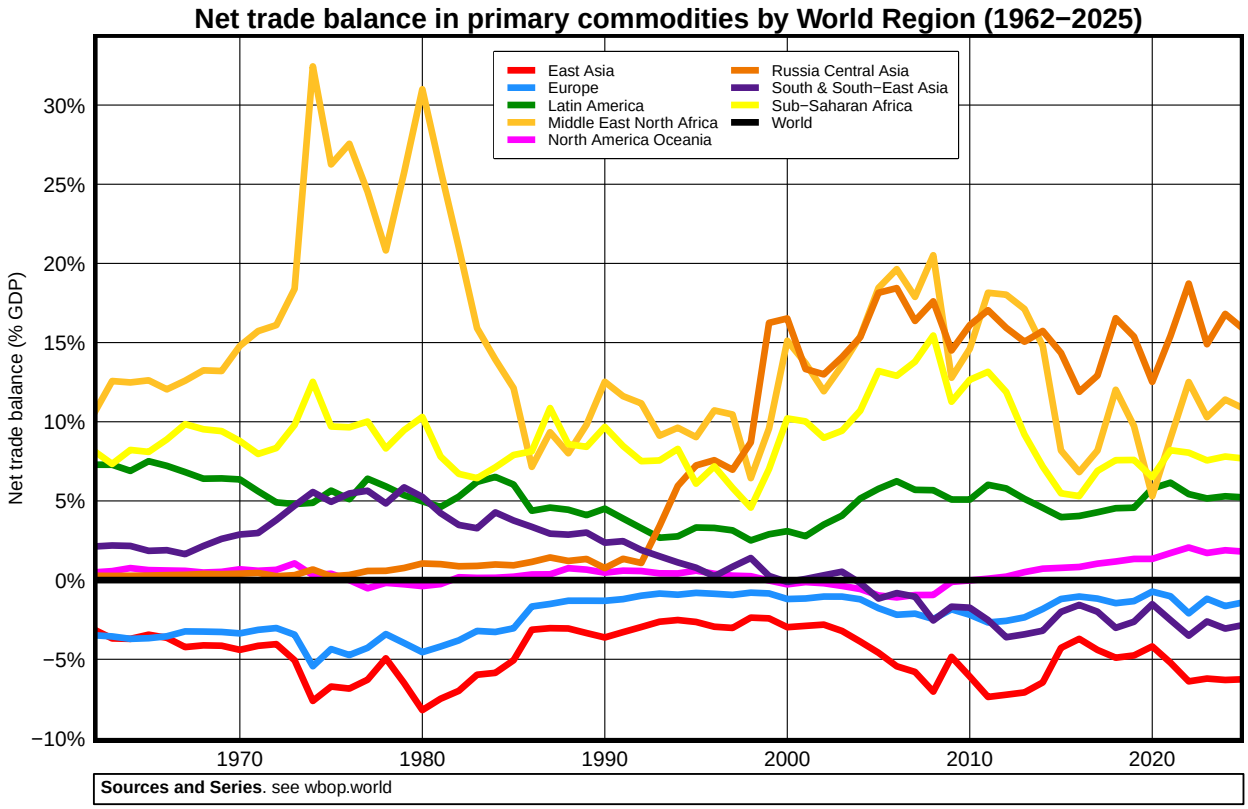

Net trade balance in primary commodities by World Region (1962−2025)
East Asia
Europe
Latin America
Middle East North Africa
North America Oceania
Russia Central Asia
South & South−East Asia
Sub−Saharan Africa
World
Net trade balance (% GDP)
30%
25%
20%
15%
10%
5%
0%
−5%
−10%
1970
1980
1990
2000
2010
2020
Sources and Series. see wbop.world

**Figure 6**

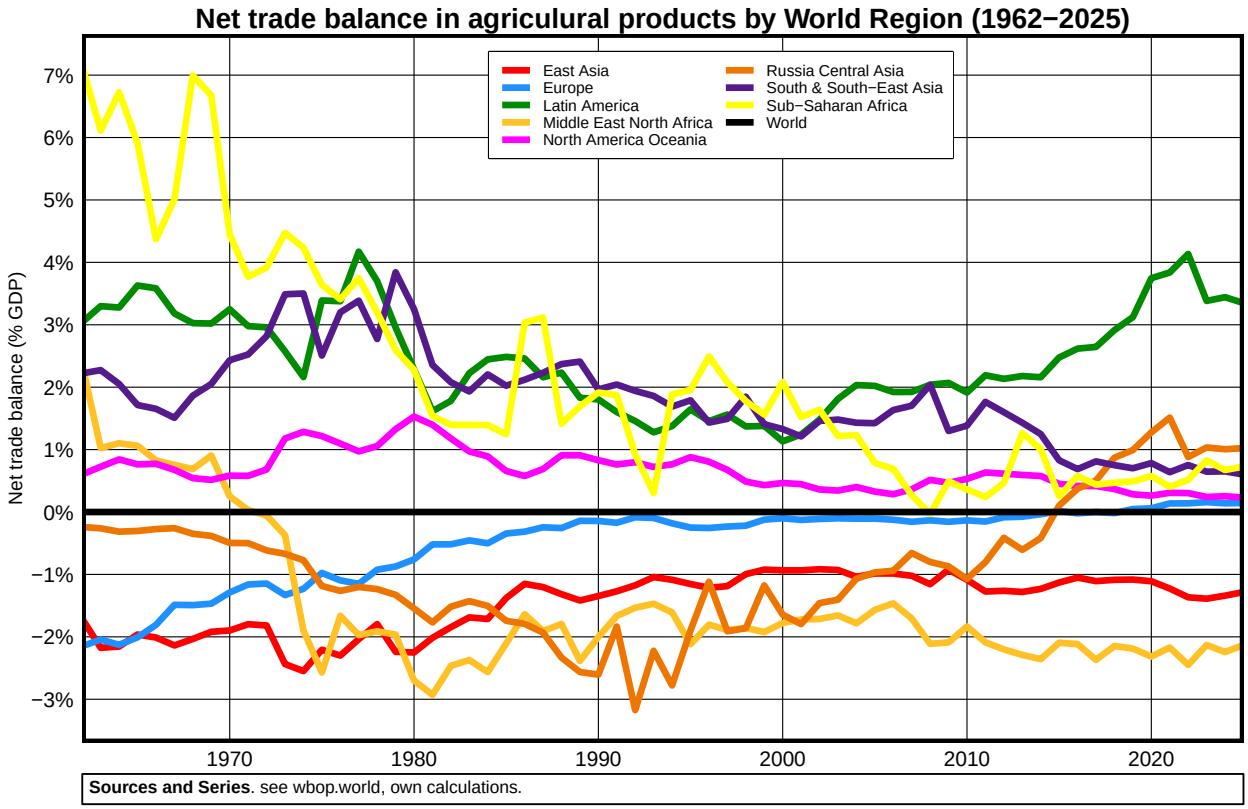

Net trade balance in agricultural products by World Region (1962−2025)
East Asia
Europe
Latin America
Middle East North Africa
North America Oceania
Russia Central Asia
South & South−East Asia
Sub−Saharan Africa
World
Net trade balance (% GDP)
7%
6%
5%
4%
3%
2%
1%
0%
−1%
−2%
−3%
1970
1980
1990
2000
2010
2020
Sources and Series. see wbop.world, own calculations.

**Figure 7**

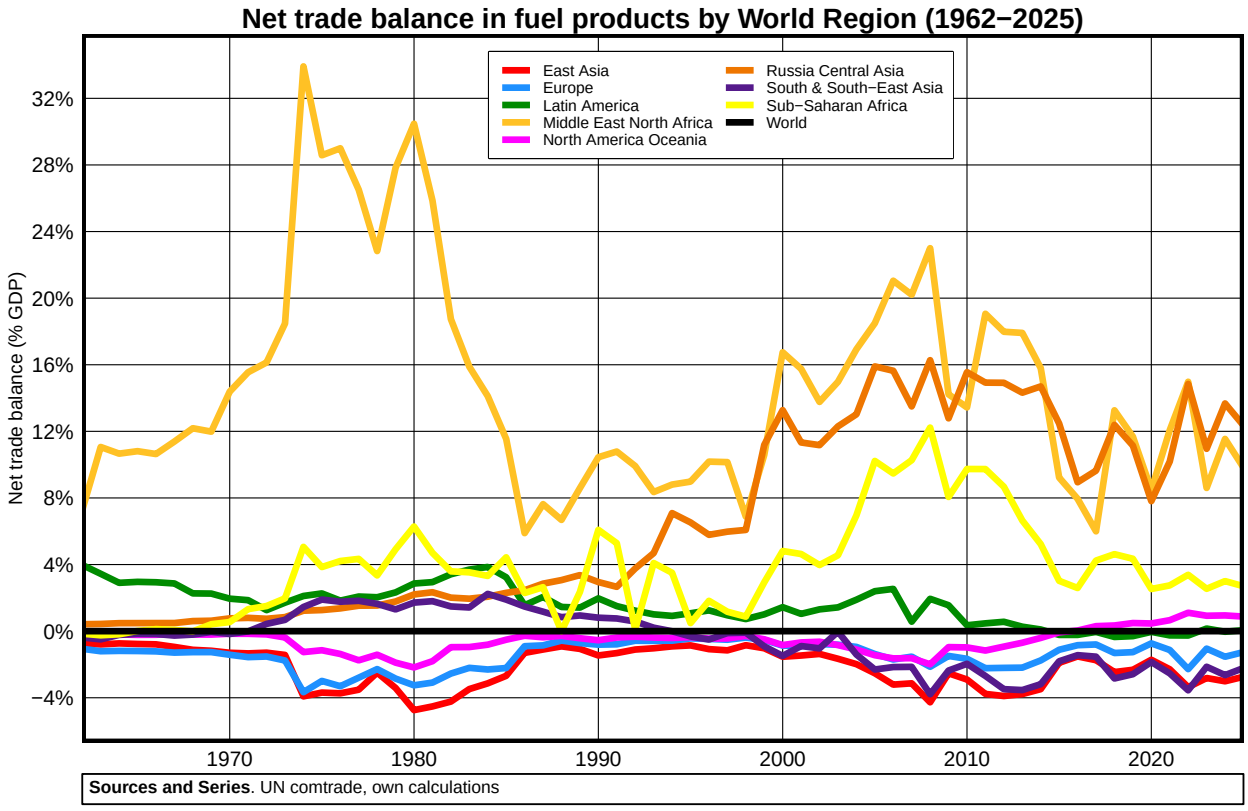

Net trade balance in fuel products by World Region (1962−2025)
East Asia
Europe
Latin America
Middle East North Africa
North America Oceania
Russia Central Asia
South & South−East Asia
Sub−Saharan Africa
World
Net trade balance (% GDP)
32%
28%
24%
20%
16%
12%
8%
4%
0%
−4%
1970
1980
1990
2000
2010
2020
Sources and Series. UN comtrade, own calculations

**Figure 8**

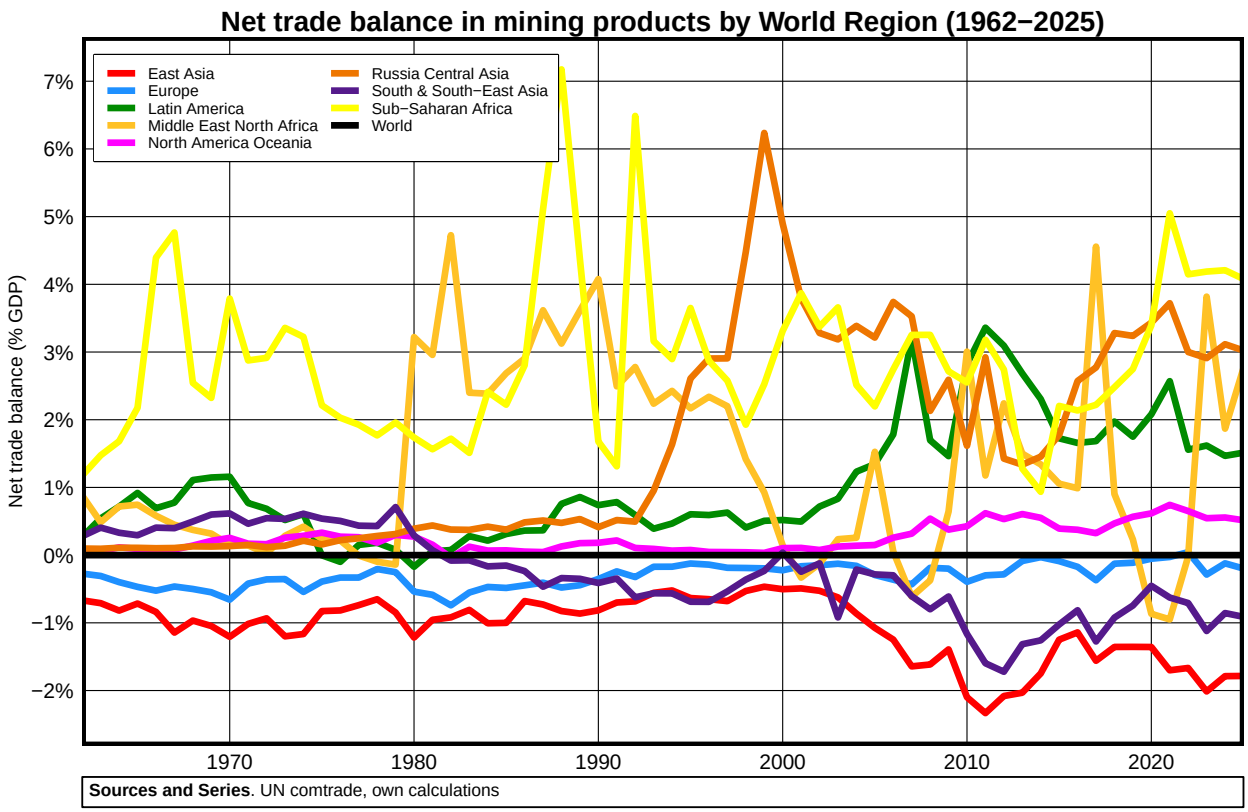

Net trade balance in mining products by World Region (1962−2025)
East Asia
Europe
Latin America
Middle East North Africa
North America Oceania
Russia Central Asia
South & South−East Asia
Sub−Saharan Africa
World
Net trade balance (% GDP)
7%
6%
5%
4%
3%
2%
1%
0%
−1%
−2%
1970
1980
1990
2000
2010
2020
Sources and Series. UN comtrade, own calculations

**Figure 9**

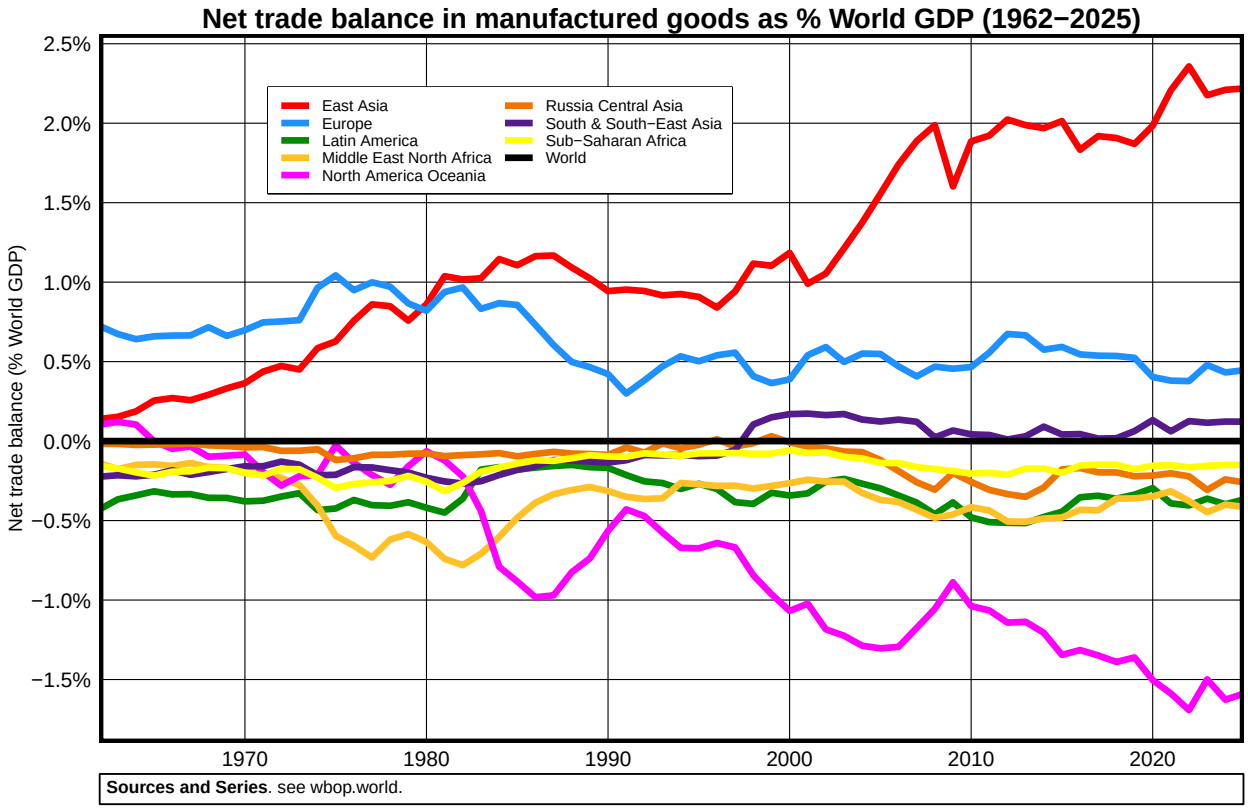

Net trade balance in manufactured goods as % World GDP (1962−2025)
Net trade balance (% World GDP)
2.5%
2.0%
1.5%
1.0%
0.5%
0.0%
−0.5%
−1.0%
−1.5%
1970
1980
1990
2000
2010
2020
East Asia
Europe
Latin America
Middle East North Africa
North America Oceania
Russia Central Asia
South & South−East Asia
Sub−Saharan Africa
World
Sources and Series. see wbop.world.

**Figure 10**

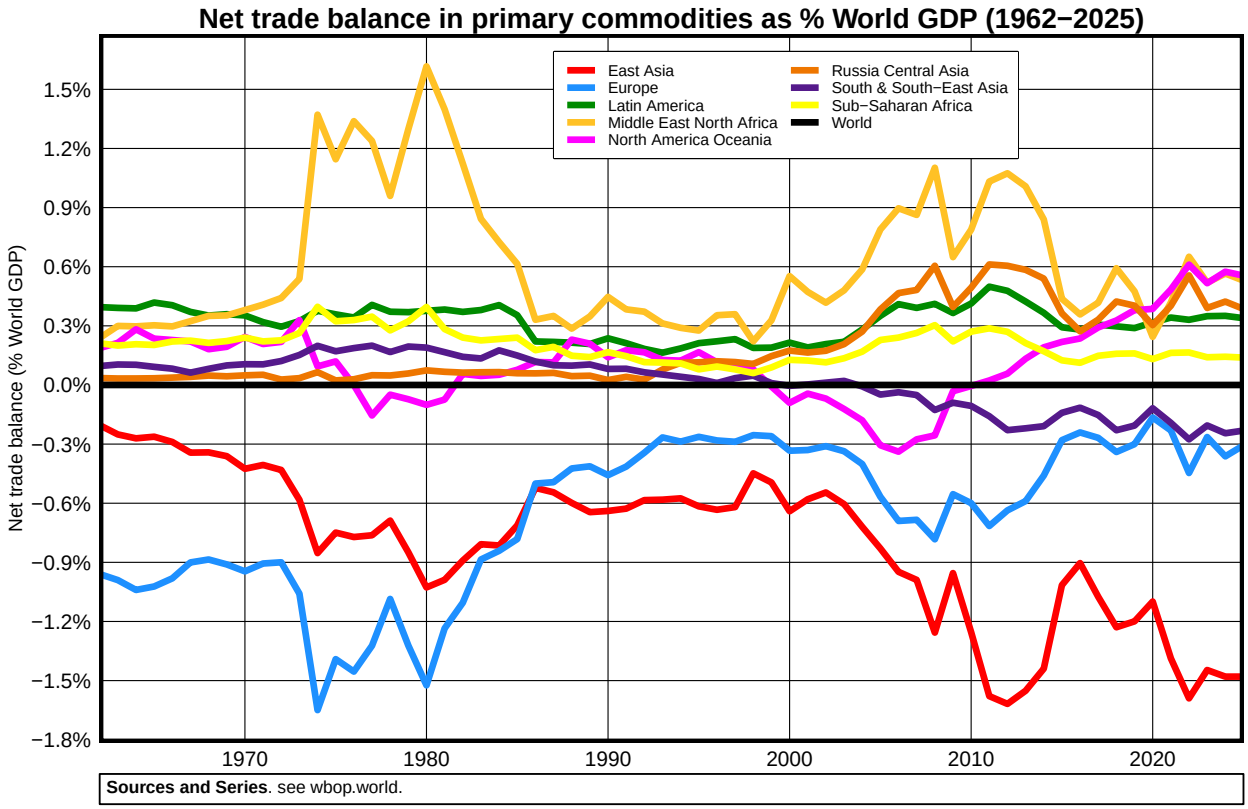

Net trade balance in primary commodities as % World GDP (1962−2025)
East Asia
Europe
Latin America
Middle East North Africa
North America Oceania
Russia Central Asia
South & South−East Asia
Sub−Saharan Africa
World
Net trade balance (% World GDP)
1.5%
1.2%
0.9%
0.6%
0.3%
0.0%
−0.3%
−0.6%
−0.9%
−1.2%
−1.5%
−1.8%
1970
1980
1990
2000
2010
2020
Sources and Series. see wbop.world.

**Figure 11**

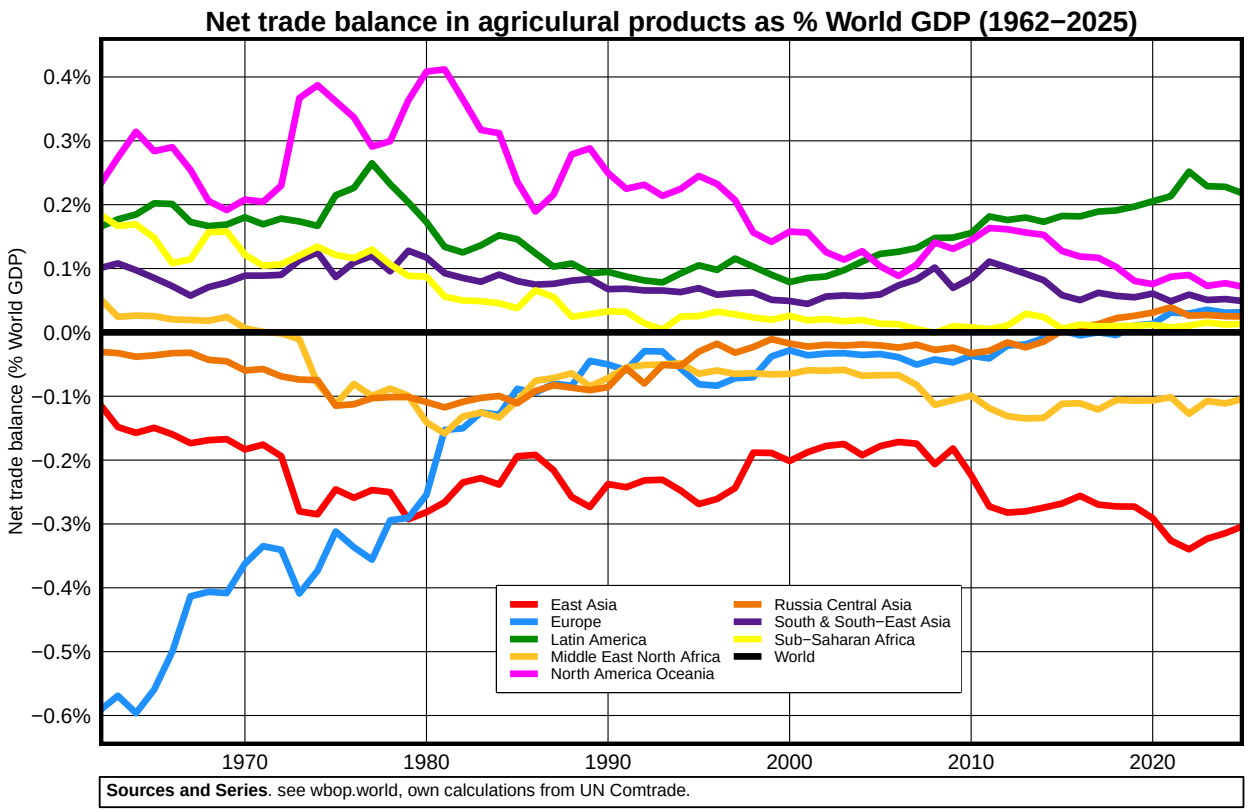

Net trade balance in agricultural products as % World GDP (1962−2025)
Net trade balance (% World GDP)
0.4%
0.3%
0.2%
0.1%
0.0%
−0.1%
−0.2%
−0.3%
−0.4%
−0.5%
−0.6%
1970
1980
1990
2000
2010
2020
East Asia
Europe
Latin America
Middle East North Africa
North America Oceania
Russia Central Asia
South & South−East Asia
Sub−Saharan Africa
World
Sources and Series. see wbop.world, own calculations from UN Comtrade.

**Figure 12**

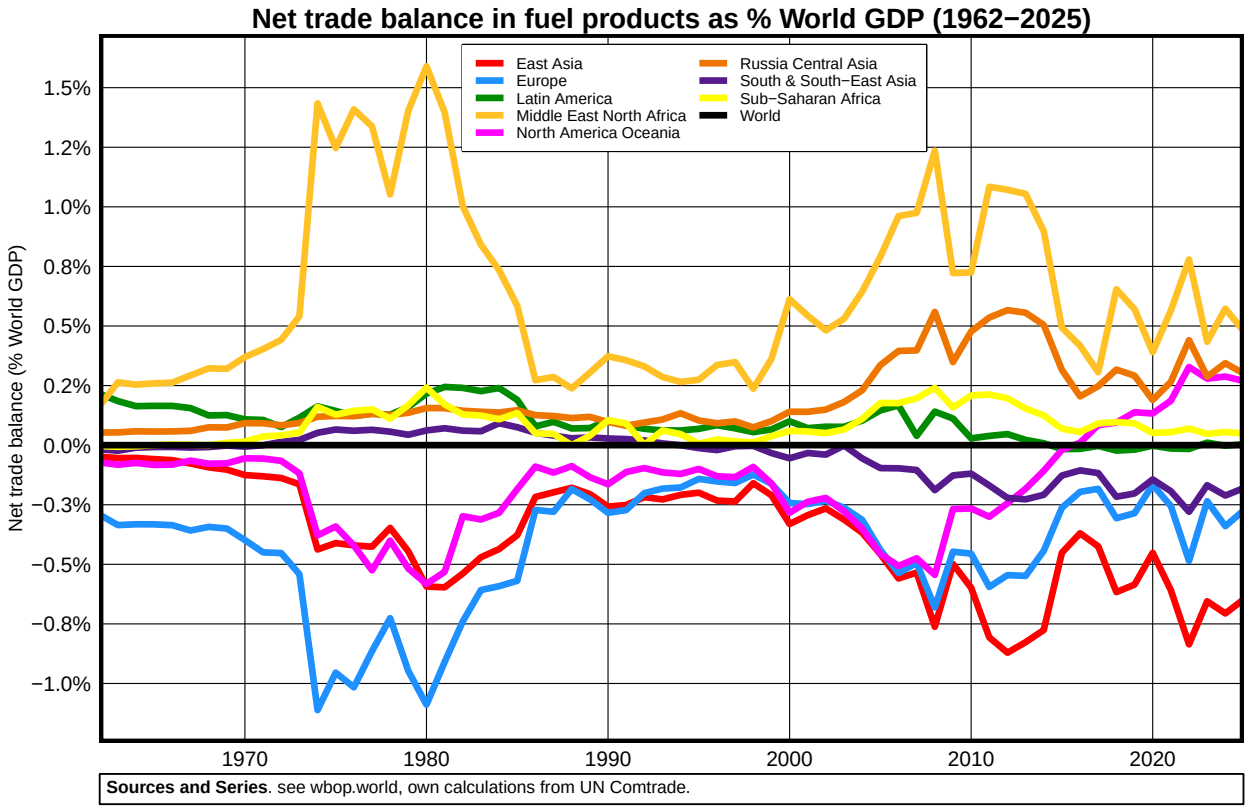

Net trade balance in fuel products as % World GDP (1962−2025)
East Asia
Europe
Latin America
Middle East North Africa
North America Oceania
Russia Central Asia
South & South−East Asia
Sub−Saharan Africa
World
Net trade balance (% World GDP)
1.5%
1.2%
1.0%
0.8%
0.5%
0.2%
0.0%
−0.3%
−0.5%
−0.8%
−1.0%
1970
1980
1990
2000
2010
2020
Sources and Series. see wbop.world, own calculations from UN Comtrade.

**Figure 13**

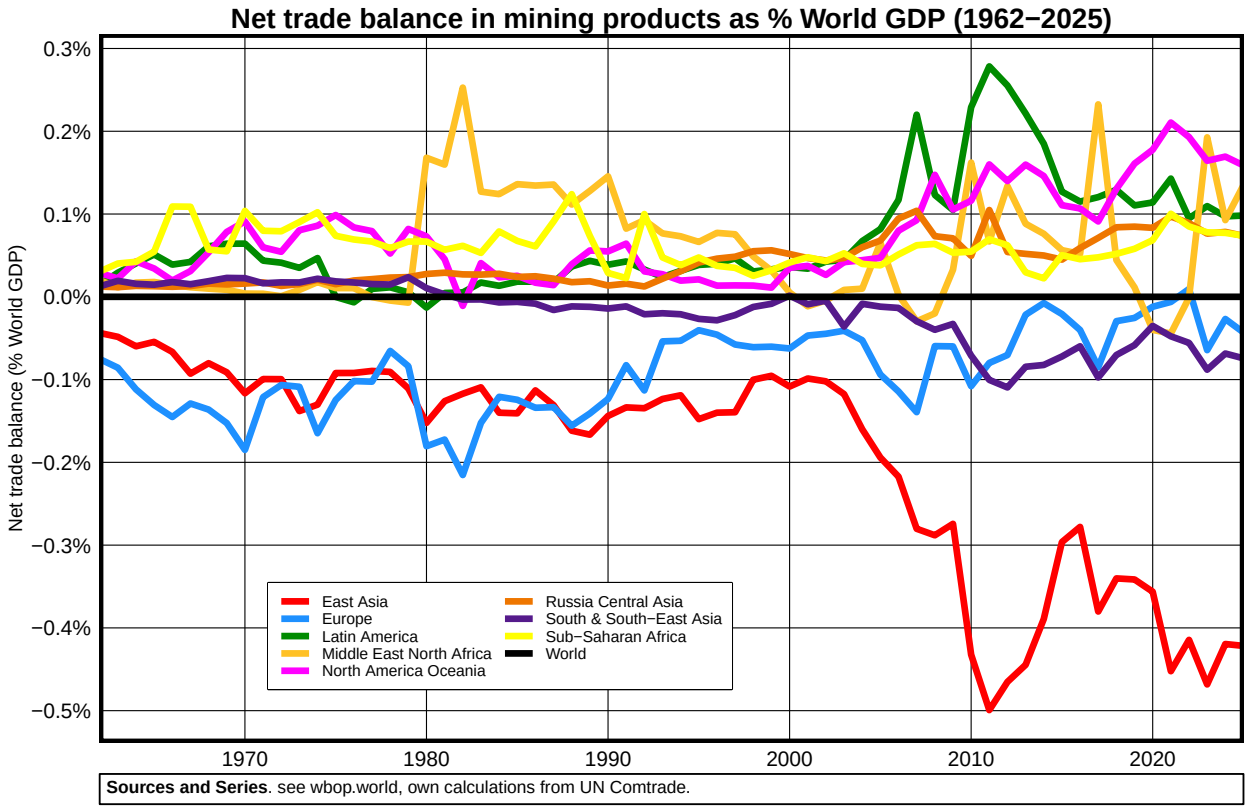
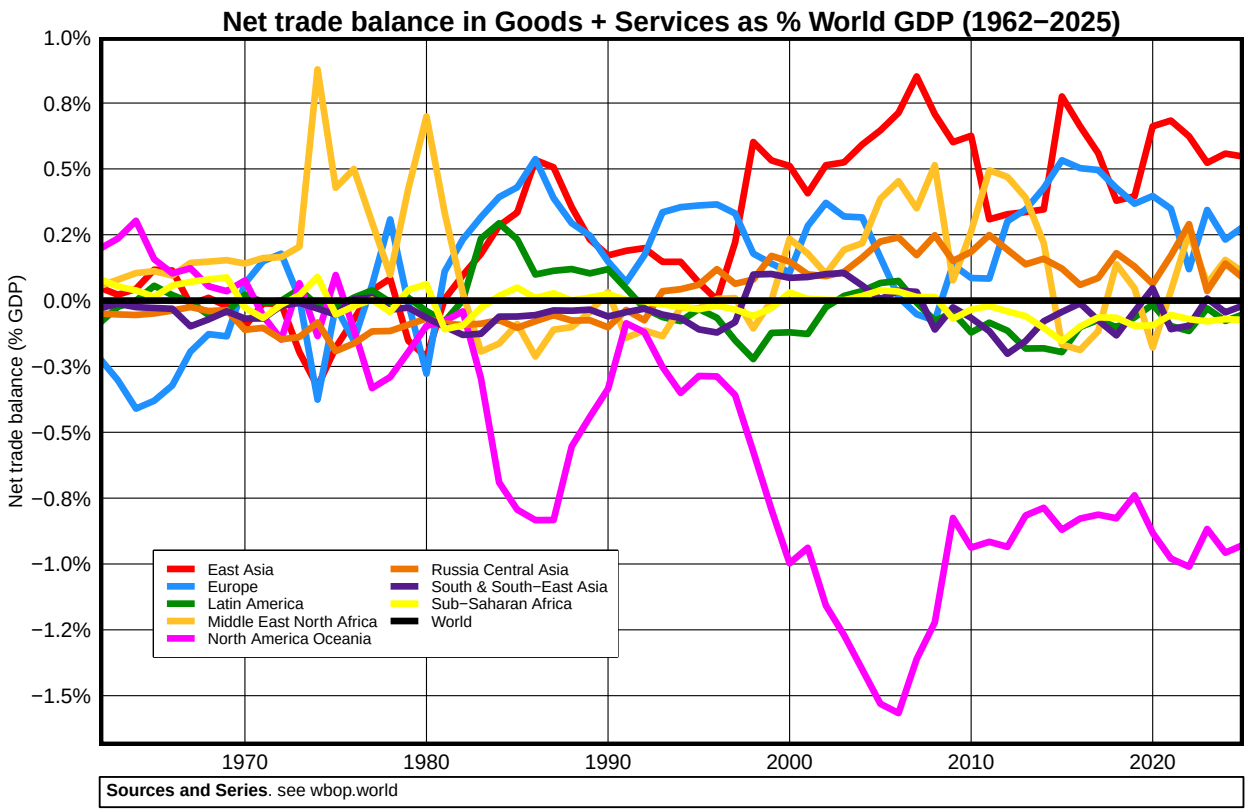
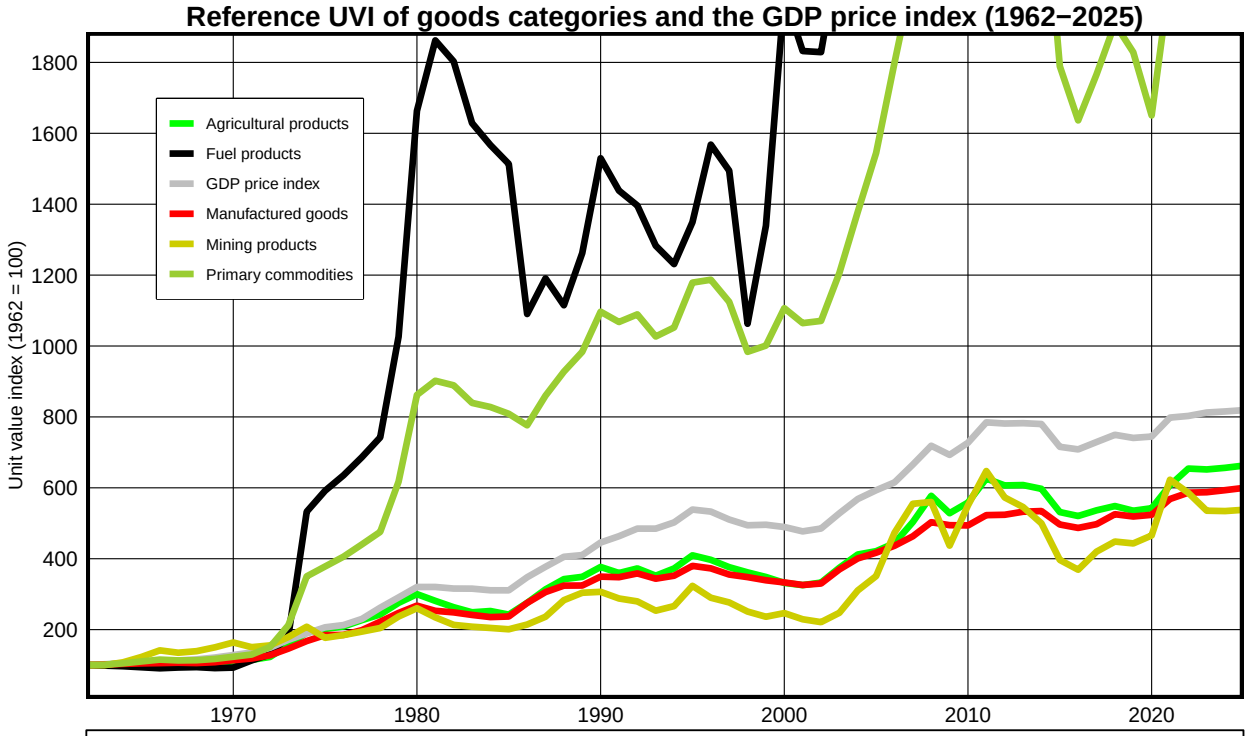

Net trade balance in mining products as % World GDP (1962−2025)
Net trade balance (% World GDP)
0.3%
0.2%
0.1%
0.0%
−0.1%
−0.2%
−0.3%
−0.4%
−0.5%
1970
1980
1990
2000
2010
2020
East Asia
Europe
Latin America
Middle East North Africa
North America Oceania
Russia Central Asia
South & South−East Asia
Sub−Saharan Africa
World
Sources and Series. see wbop.world, own calculations from UN Comtrade.

**Figure 14**


Net trade balance in Goods + Services as % World GDP (1962−2025)
Net trade balance (% GDP)
1.0%
0.8%
0.5%
0.2%
0.0%
−0.3%
−0.5%
−0.8%
−1.0%
−1.2%
−1.5%
1970
1980
1990
2000
2010
2020
East Asia
Europe
Latin America
Middle East North Africa
North America Oceania
Russia Central Asia
South & South−East Asia
Sub−Saharan Africa
World
Sources and Series. see wbop.world

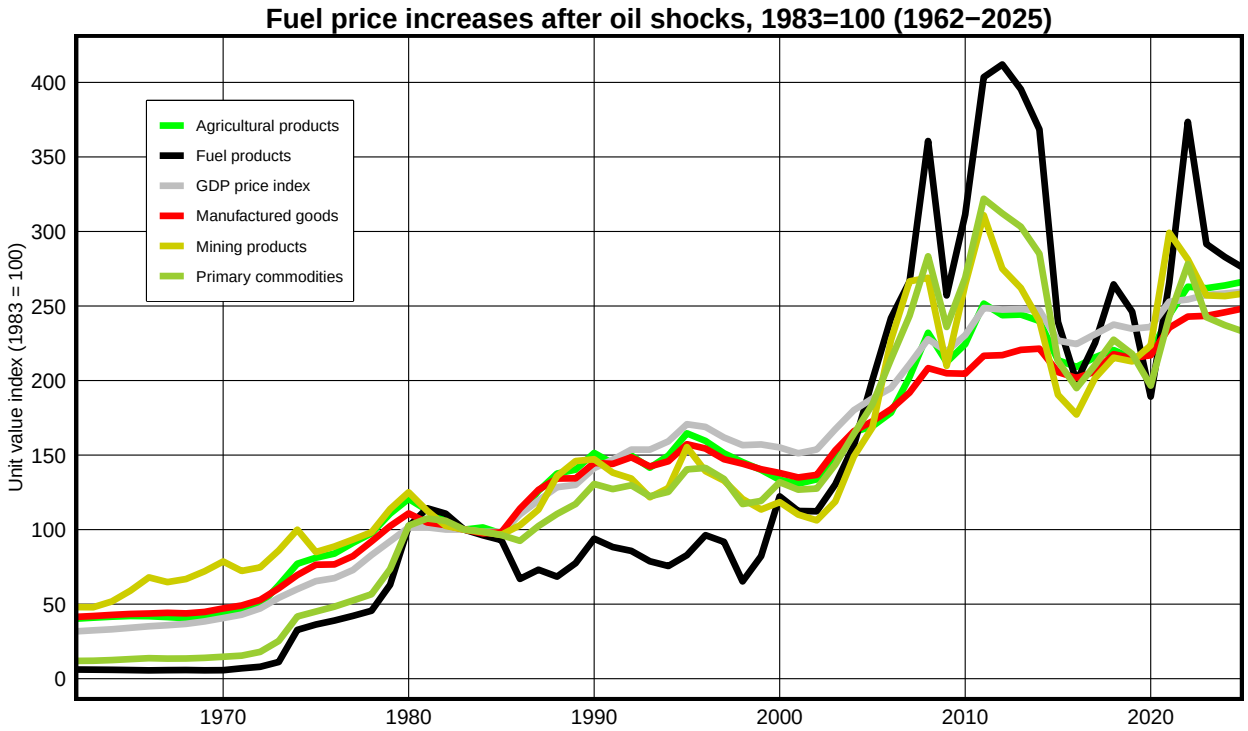
## B.2 Price-volume decomposition

**Figure 15**



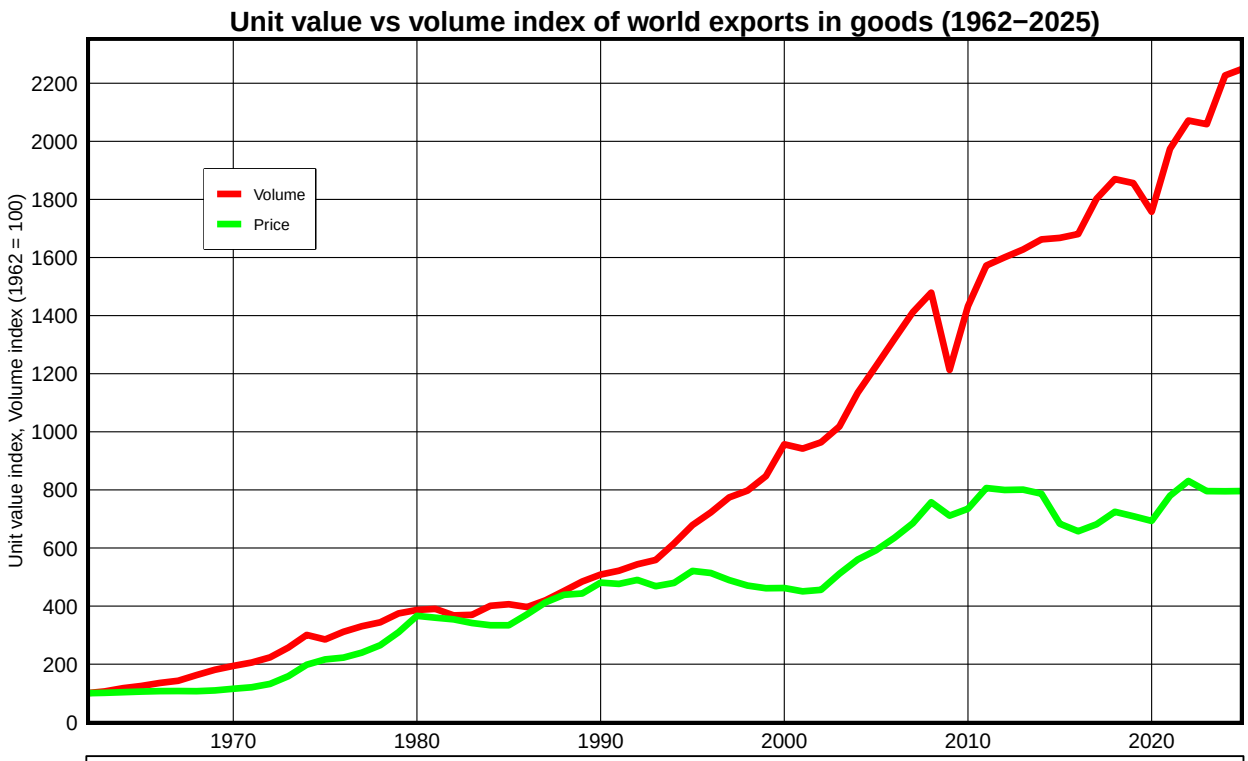

**Interpretation**. The export UVI is prefered as it exclude the CIF component, which is a price of services. However, for mining and fuel products we use the pooled export and import UVI to have more observations. The primary commodity UVI is heavily driven by fuel prices thus a decomposition is more sensible. World price of agriculture products follow closely and slightly outspan prices of manufacturing goods

**Figure 16**



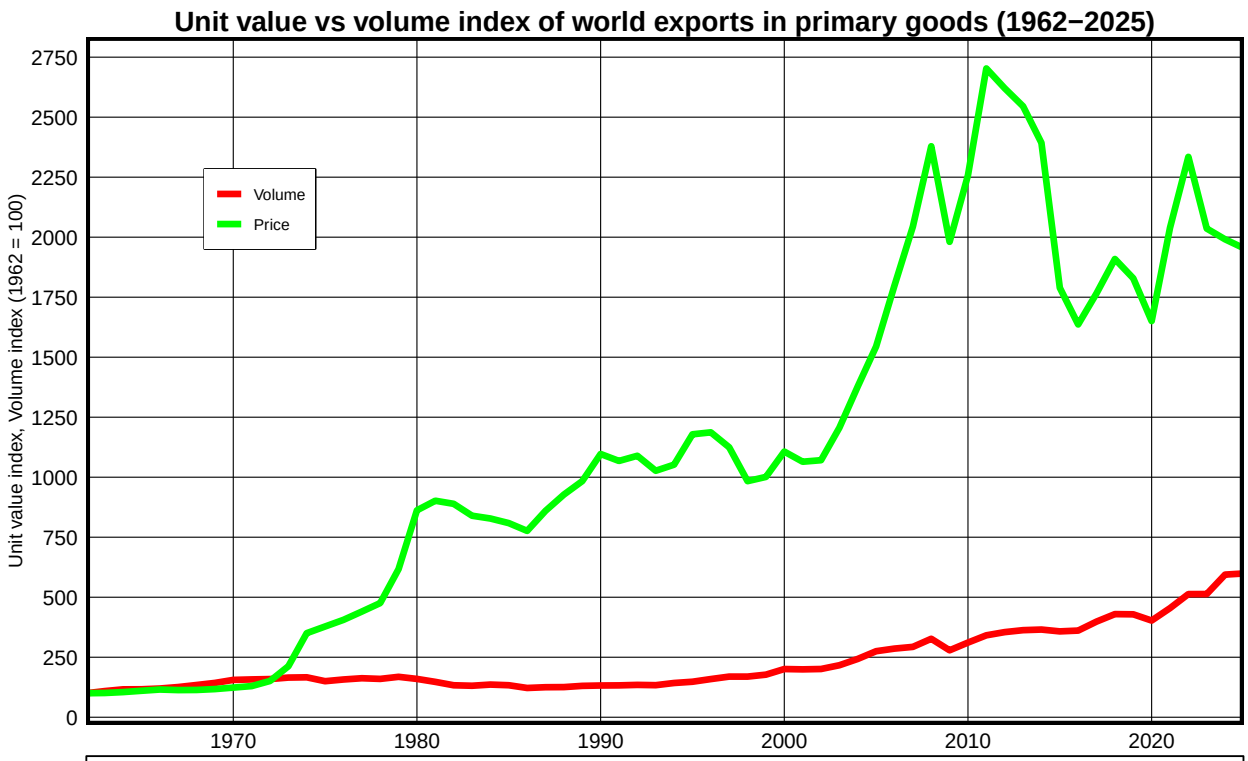

**Interpretation**. Price indices are set to 1983 because it is after the two oil shocks (1973 and 1979) and before the counter−oil shock of 1985−6. The price index cumulate annual variations starting from the reference year. This allows us to show more clearly that very high relative fuel price as compared to 1962 levels are mainly due to the bargaining power of the OPEC in the 1970s.

**Figure 17**



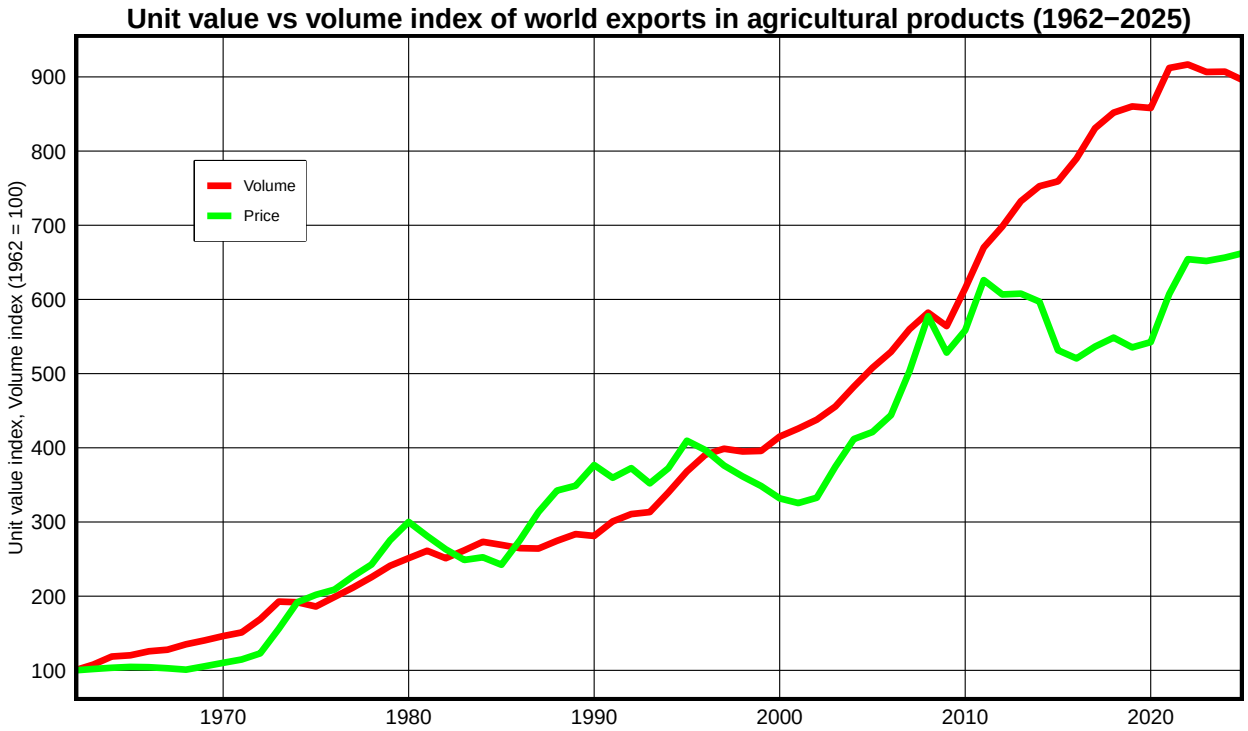

**Interpretation**. Volume index is the value index deflated by the UVI of exports. By definition, the figures are the same for world imports. From 1962 to 2025, the price of goods exchanged increased by 700% while their volume by 2100%

**Figure 18**



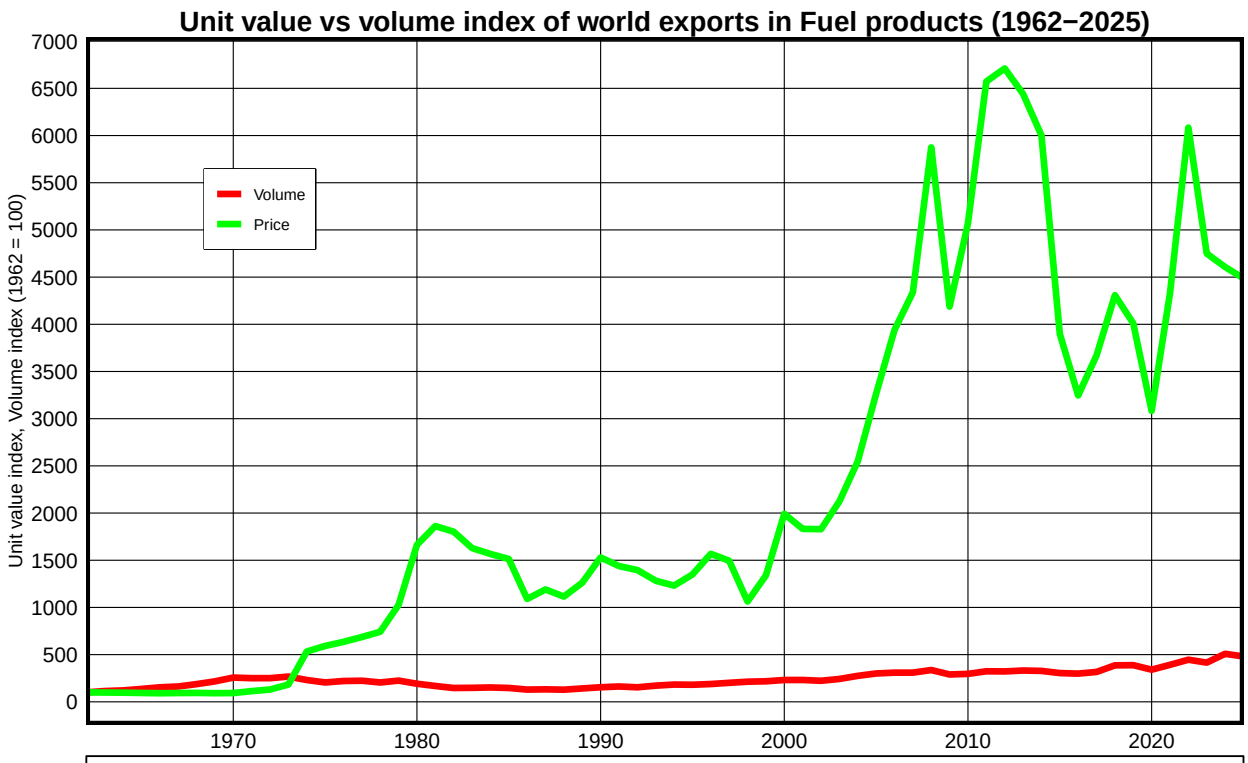

**Interpretation**. Volume index is the value index deflated by the UVI of exports. By definition, the figures are the same for world imports. From 1962 to 2025, the price of primary goods exchanged increased by 1900% while their volume by 500%.

**Figure 19**



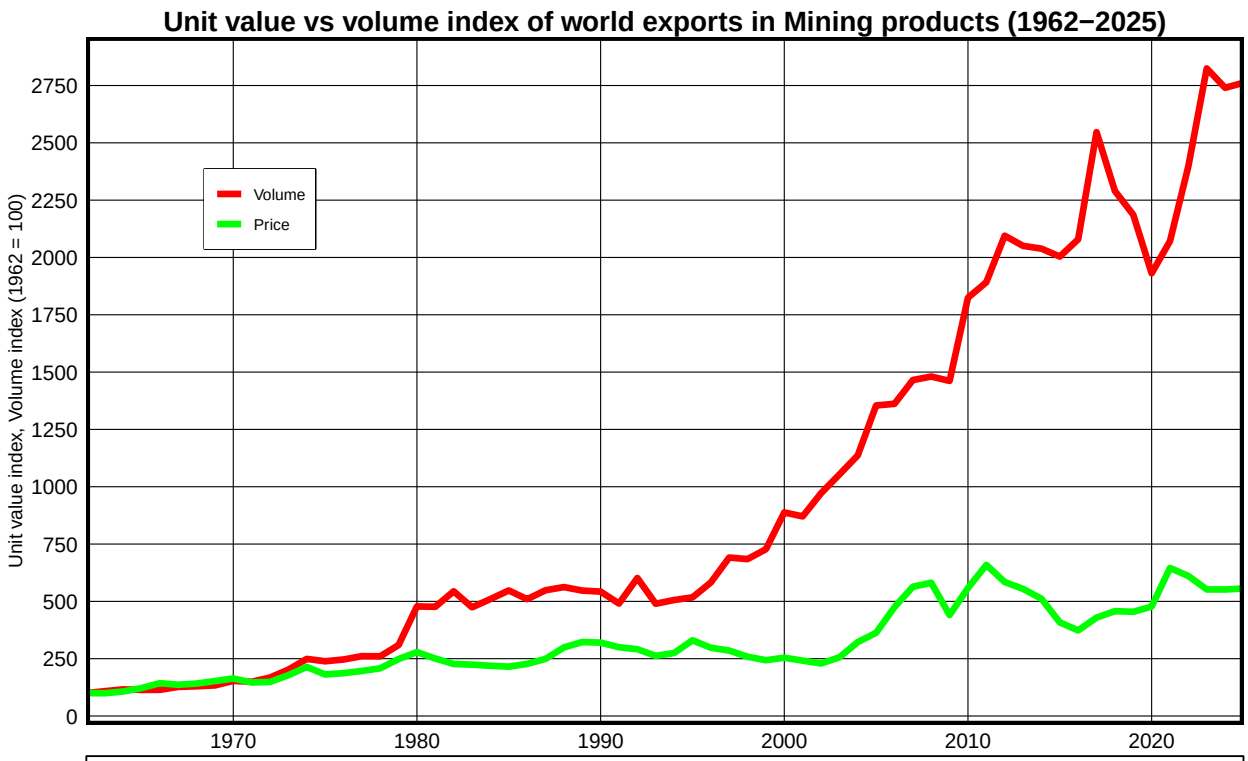

**Interpretation**. From 1962 to 2025, the price of agricultural products exchanged mainly followed the trend of volume increase until it plateau after the Great Recession while volume continue on the same trend. From 2010 to 2025 volume increased by 458% while prices by 19%. **Note** Volume index is the value index deflated by the UVI of exports.

**Figure 20**



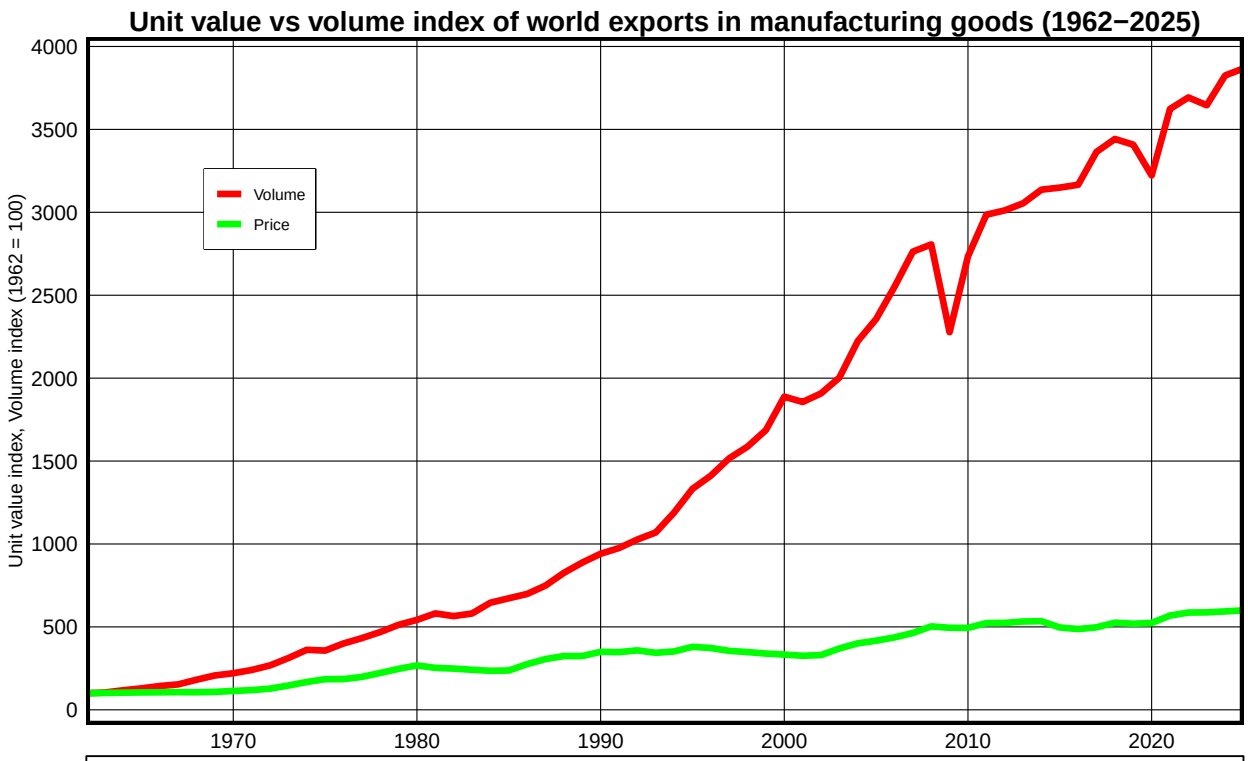

**Interpretation**. Volume index is the value index deflated by the UVI of exports. From 1962 to 2025, the price of fuel products exchanged increased by 4400% while their volume by 380%.

**Figure 21**




**Interpretation**. Volume index is the value index deflated by the UVI of exports. From 1962 to 2025, the price of mining products exchanged increased by 2650% while their volume by 500%.

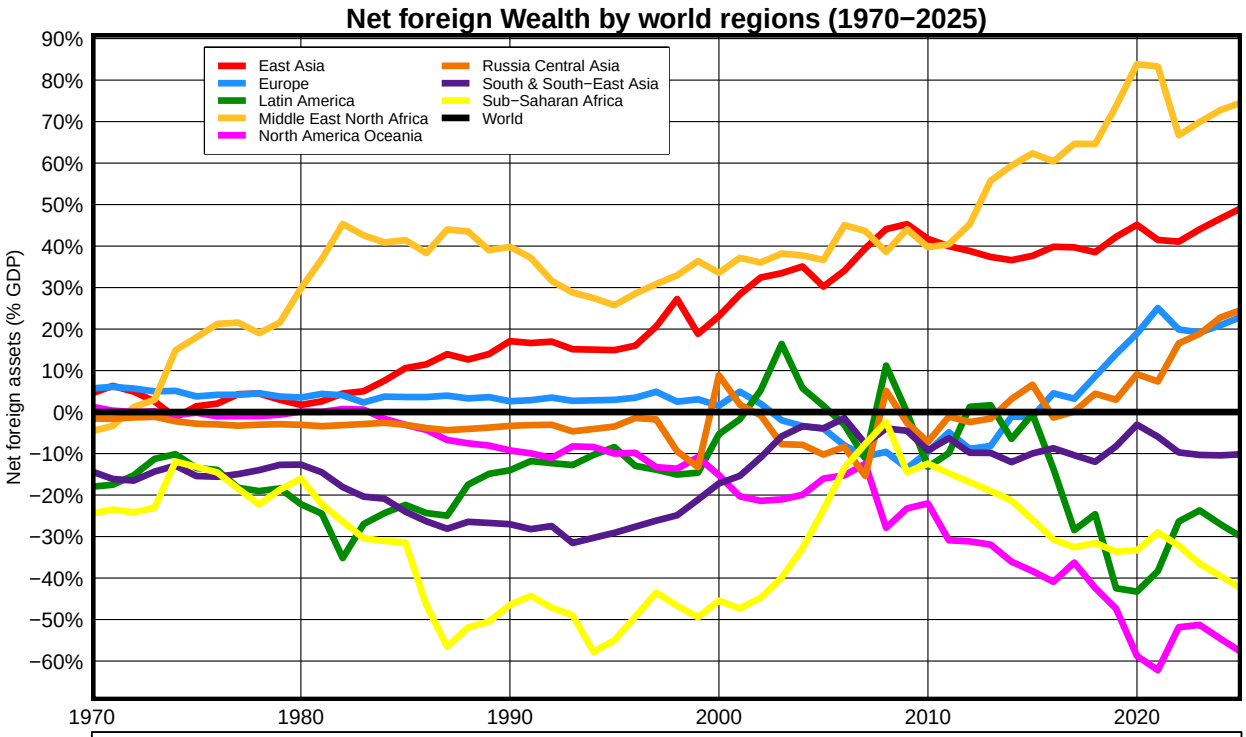
**Figure 22**




**Interpretation**. Volume index is the value index deflated by the UVI of exports. From 1962 to 2025, the price of manufacturing goods exchanged increased by 3800% while their volume by 500%.

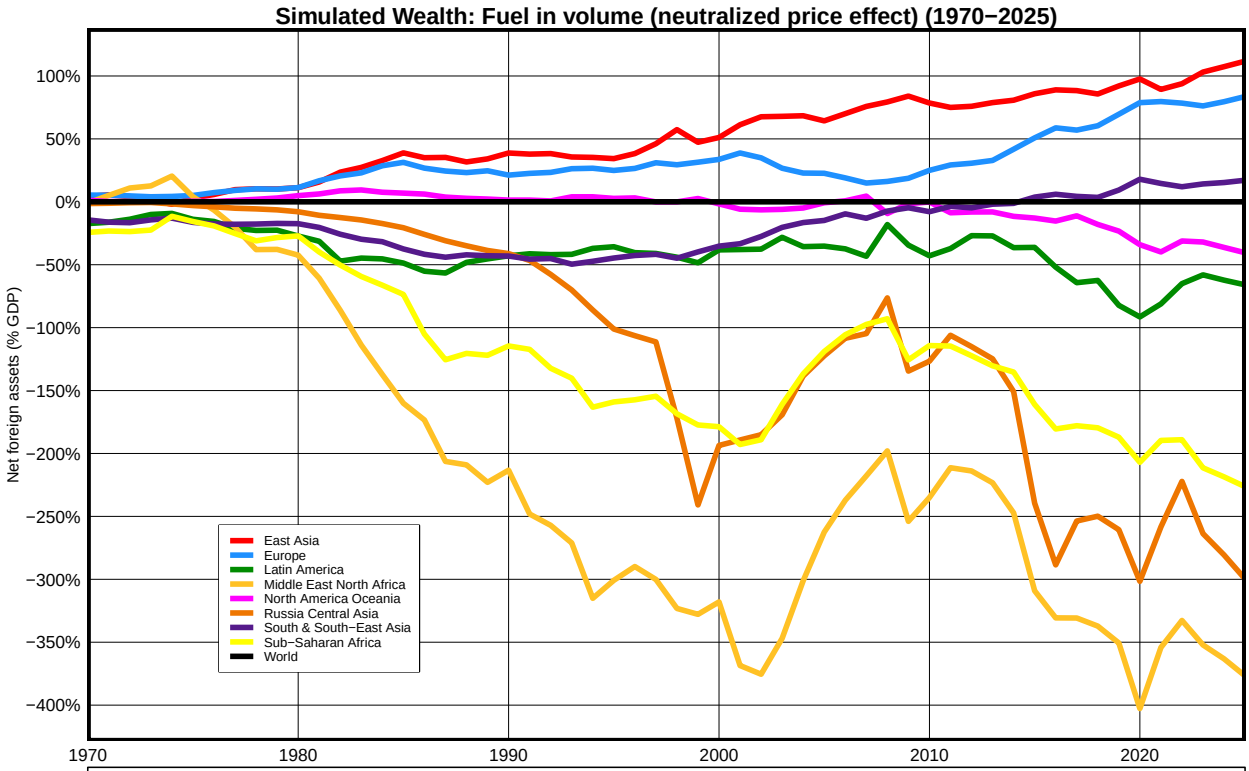
## B.3 NFA Simulations

**Figure 23**



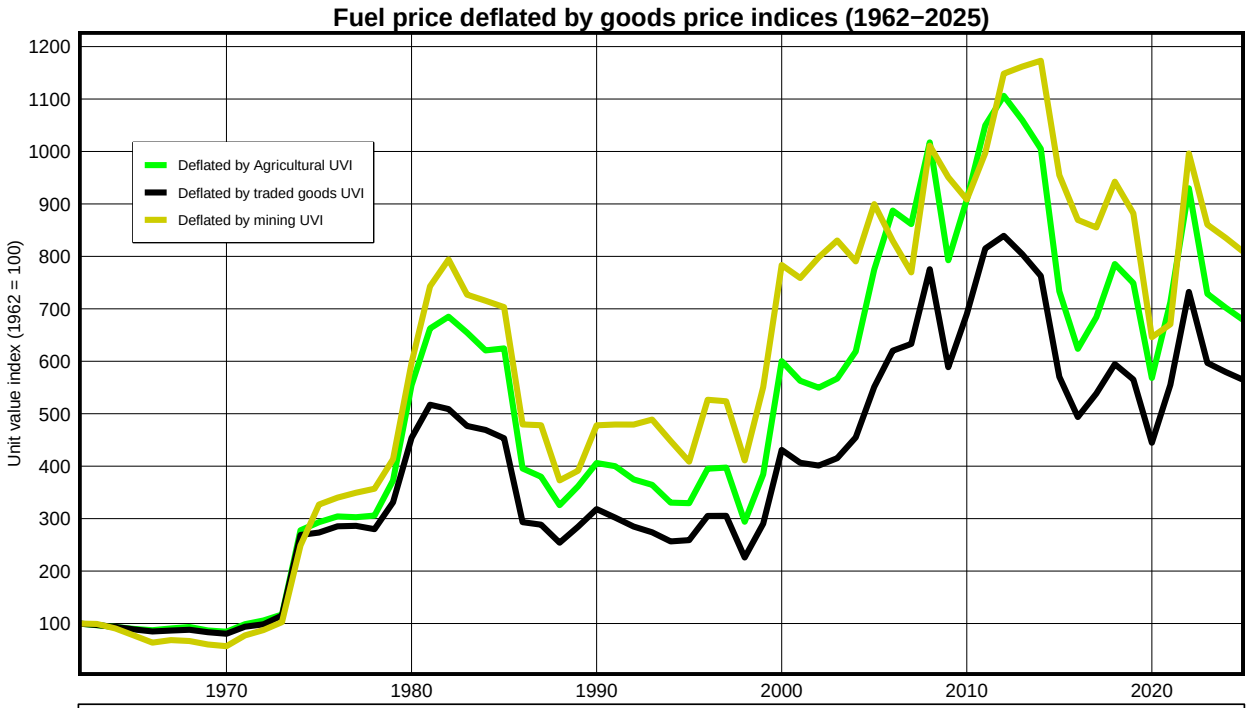

**Interpretation**. The new manufacturing power in East Asia (mainly China and Japan) accumulated a substential foreign wealth (49% of its GDP in 2025) together with oil countries in the MENA (75%). However for the latter it has to be noted that their GDP represent a small part of the world GDP. **Sources and series** : wbop.world

**Figure 24**



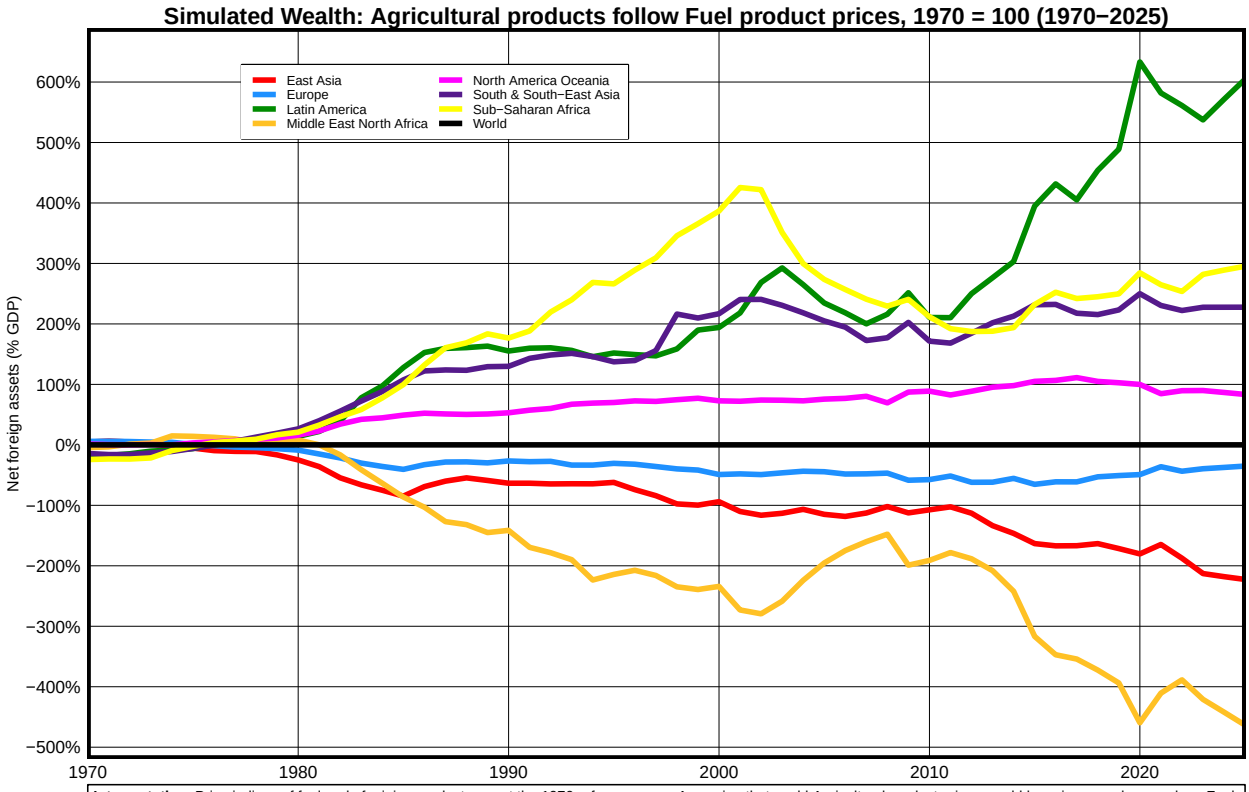

**Interpretation**. We assume fuel products price would have followed world GDP price idex. It neutralizes the dramatic rise in fuel prices during the period. The result is clear, without the transfer of value from high fuel prices the MENA would owe a substantial foreign debt (−377% of its GDP vs +75% in reality). The international indebtness position of Sub−Saharan Africa and Russia Central Asia would have significantly deteriorate.

**Figure 25**



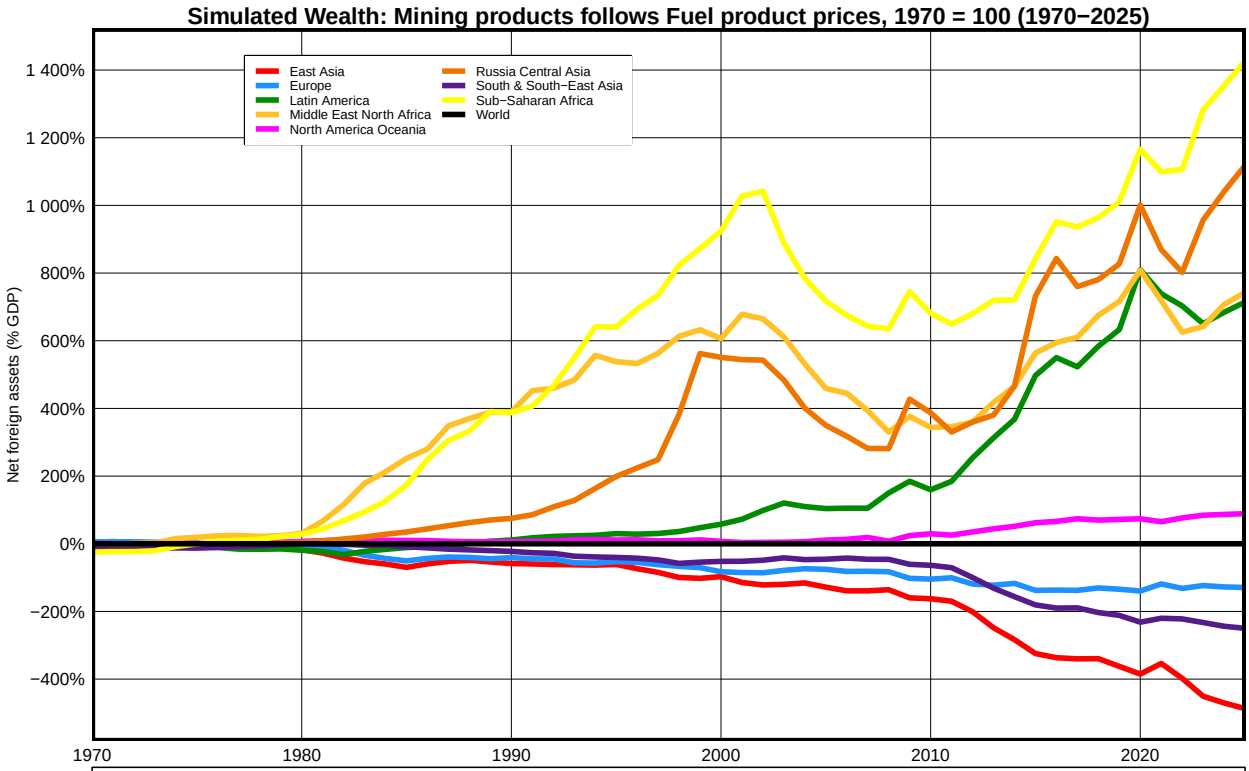

**Interpretation**. We divide fuel unit value index by agricultural products, mining products and all traded goods UVI. This is equivalent as cumulating annual changes in relative prices. In 2025, the world *relative* price of fuel products as compared to all traded goods are 5.6 times higer (increased by 460%) than what they were in 1962. There are two peaks in relative fuel prices, from 1970 to 1980 this relative price increased by 460% and from 2000 to 2010 it increased by 500%. If we take the average over the 1990s and 2010s decades, which are plateaus, we can roughly say that relative prices increased by 2,25 (125%, from 280 to 630).

**Figure 26**



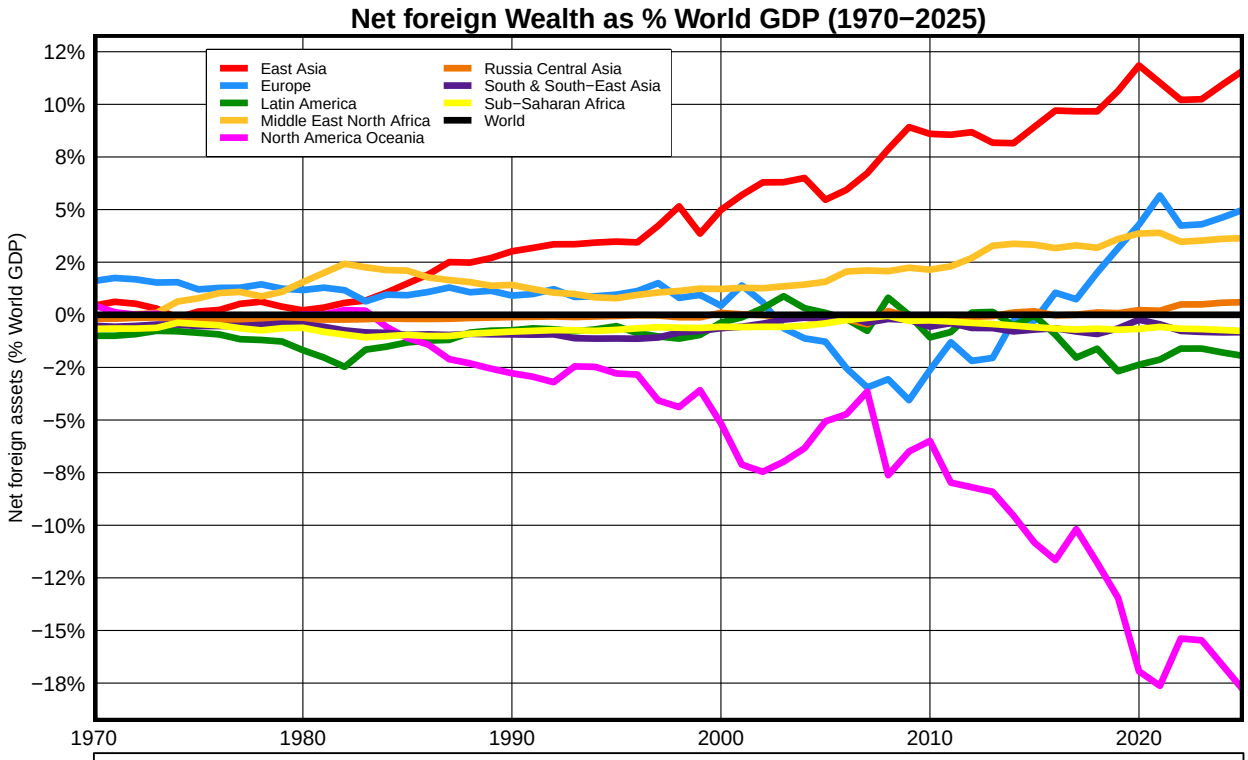

**Interpretation**. Price indices of fuel and of mining products are at the 1970 reference year. Assuming that world Agricultural product prices would have increased as much as Fuel products between 1970 and 2025, leaving all other flows unchanged, then Latin America would own a substantial foreign wealth (+600% of its GDP, vs −30% in reality).

**Figure 27**



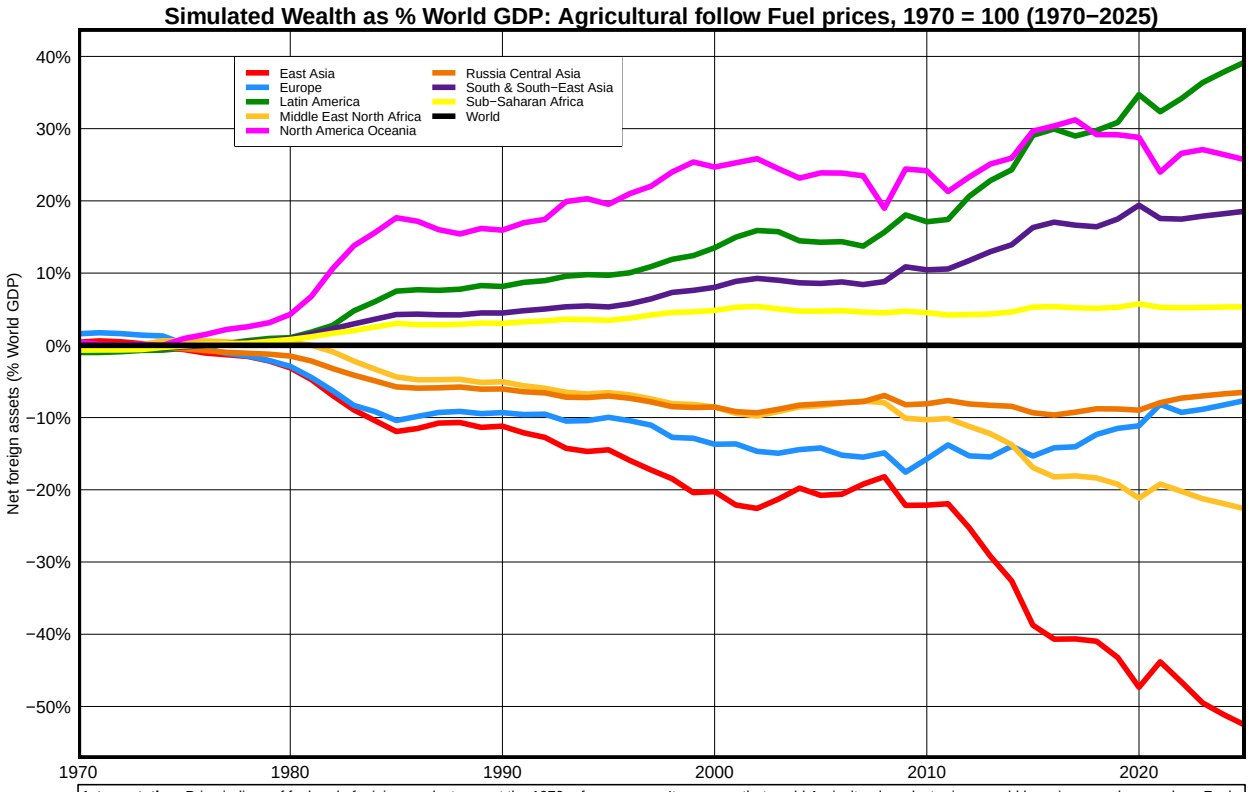

**Interpretation**. Price indices of fuel and of mining products are at the 1970 reference year. Assuming that world mining product prices would have increased as much as fuel products between 1970 and 2025, leaving all other flows unchanged, then Sub−Saharan Africa would own a substantial foreign wealth (+1426% of its GDP, vs −42% in reality) and East asia becomes a net debtor (−487% of its GDP, vs +49% in reality).

**Figure 28**



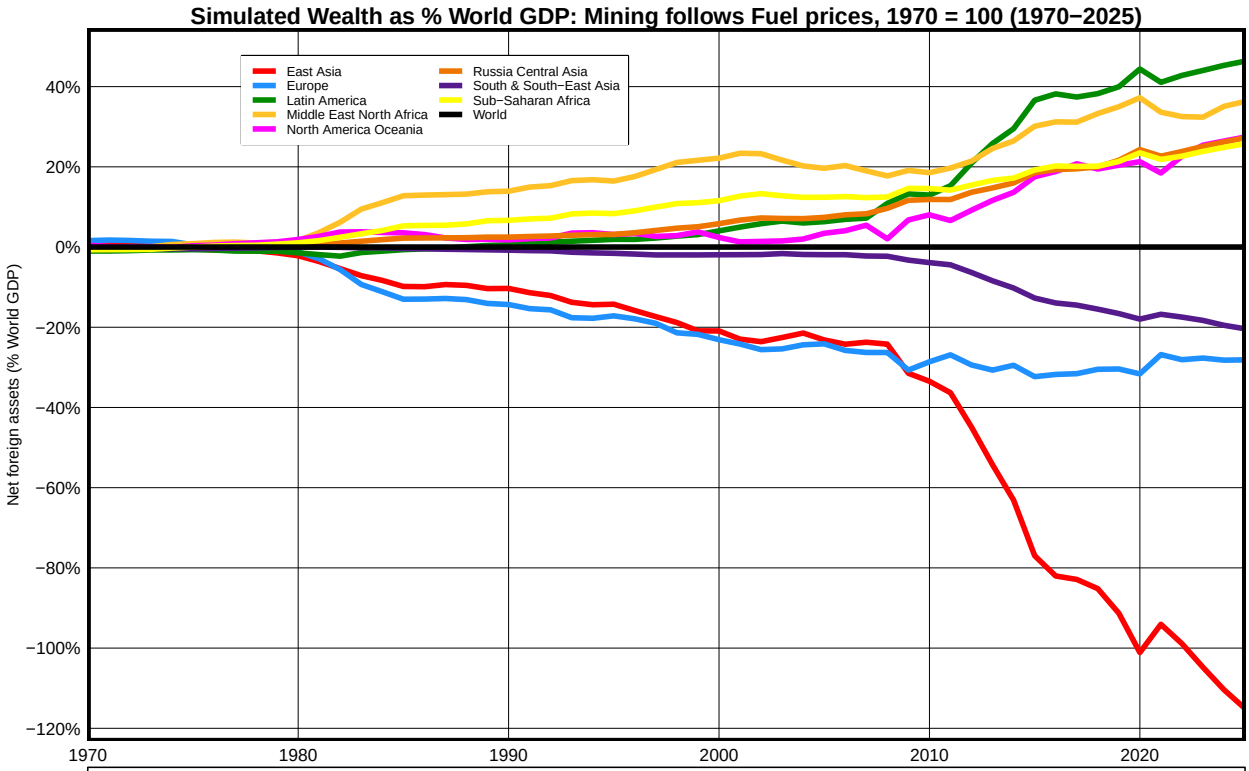

**Interpretation**. When represented in proportion of the World GDP global imbalances are mainly due to East Asia accumulated net foreign wealth (11,6% of world GDP) financing North America and Oceania indebtness (17,8%). **Sources and series** : wbop.world

**Figure 29**



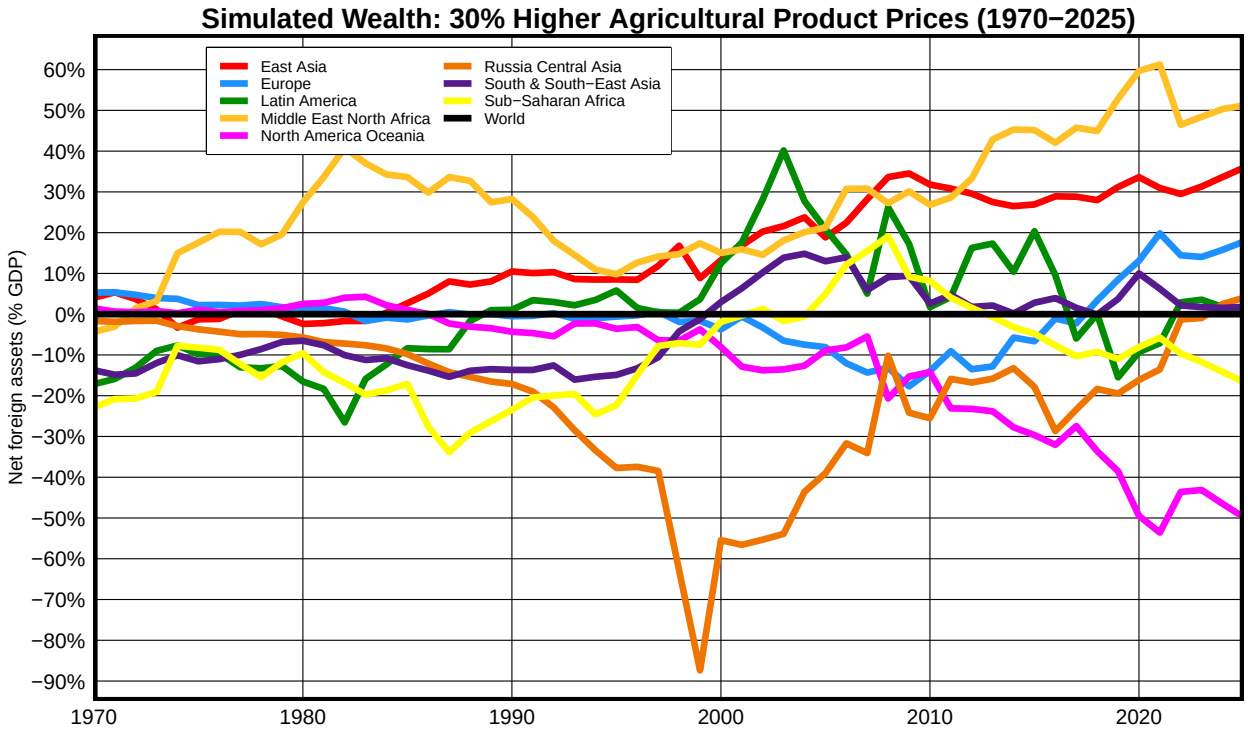

**Interpretation**. Price indices of fuel and of mining products are at the 1970 reference year. It assumes that world Agricultural product prices would have increased as much as Fuel products between 1970 and 2025, leaving all other flows unchanged. Then Latin America would own a substantial foreign wealth (+40% of world GDP, vs −2% in reality).

**Figure 30**



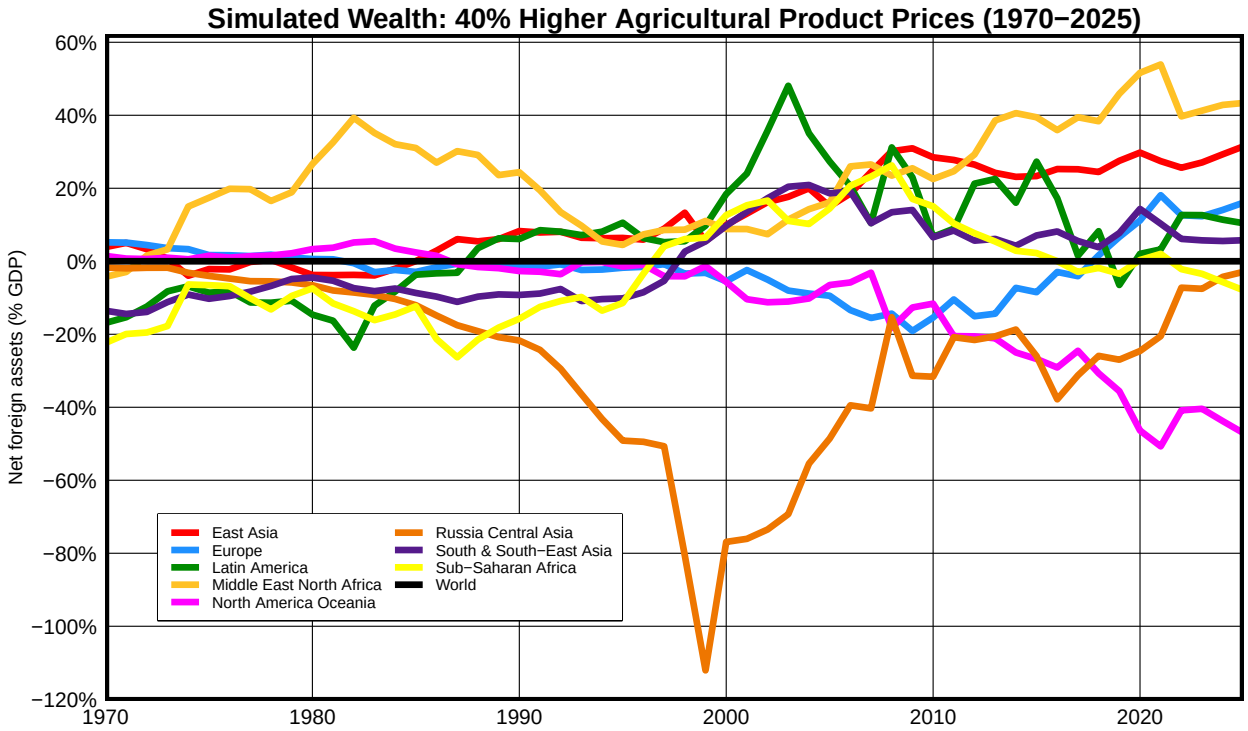

**Interpretation**. Price indices of fuel and of mining products are at the 1970 reference year. It assumes that world mining product prices would have increased as much as fuel products between 1970 and 2025. As a percentage of world GDP, the figure informs about the change in the ranking of foreign wealth by regions. Latin America replace East Asia as main owner of the world, with +46% (vs −2% in reality) in 2025 while East Asia net foreign asset represents −115% (vs +12% in reality) of world GDP.

**Figure 31**



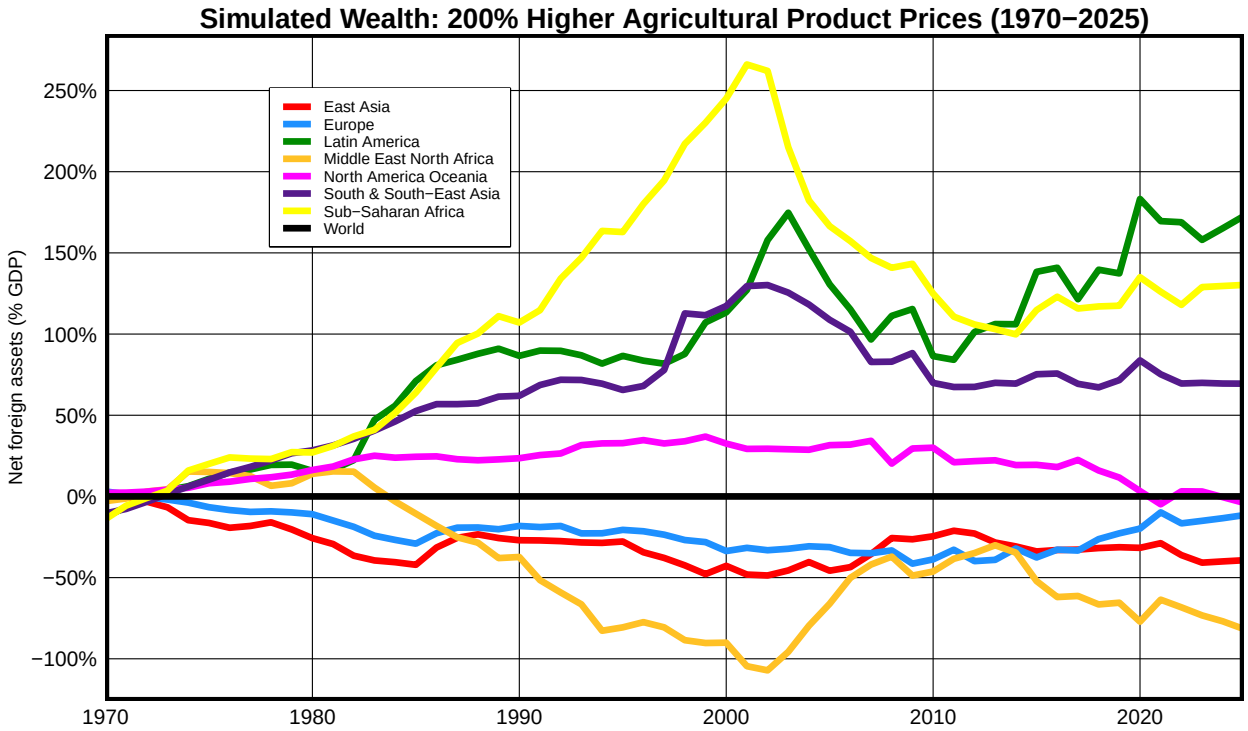

**Interpretation**. Assuming that world agricultural product prices would have been 30% higher than what they were between 1970 and 2025, leaving all other flows unchanged, then the geography of foreign wealth stay close to reality. Even if South and South−East Asia would own foreign wealth in 2025 (+1.8% of its GDP, vs −10% in reality).

**Figure 32**



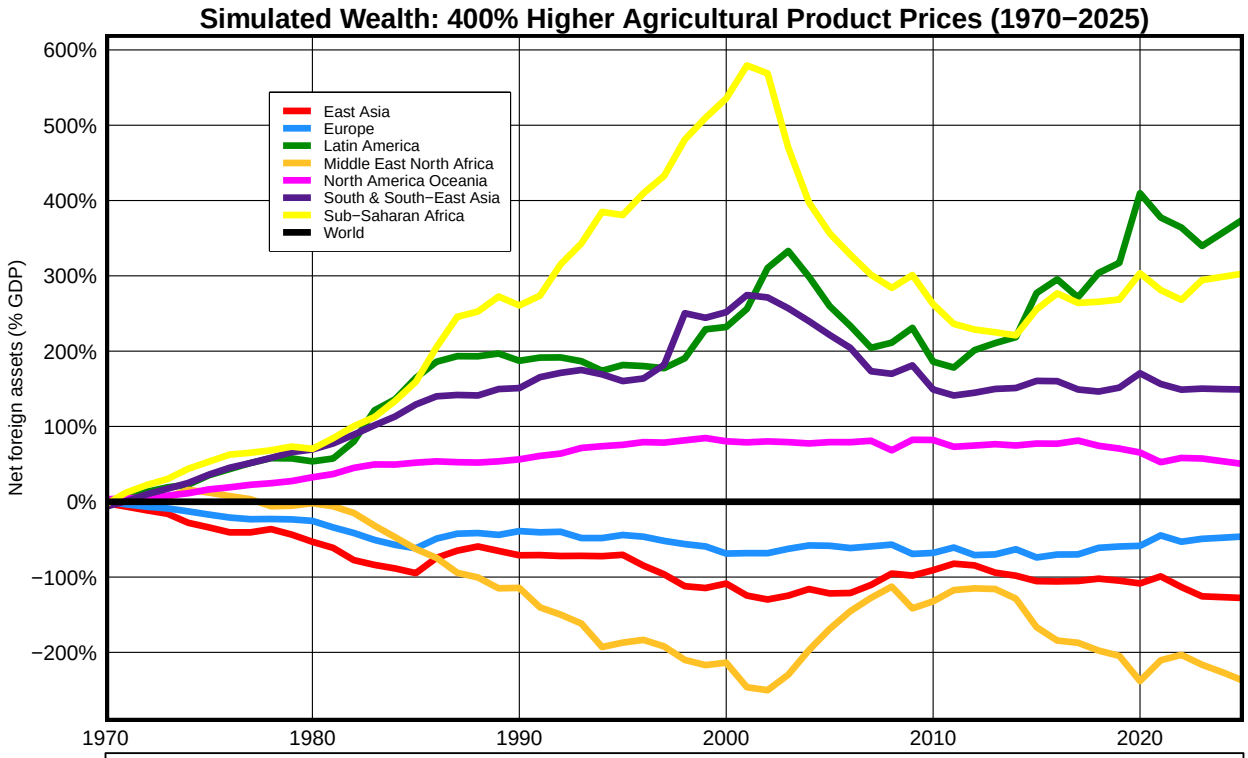

**Interpretation**. Assuming that world agricultural product prices would have been 40% higher than what they were between 1970 and 2025, leaving all other flows unchanged, then the peak in endebtness of Russia and Central Asia of the end of the 1990s would pass over 100% of their GDP. South and South−East Asia would own foreign wealth in 2025 (+5.8% of its GDP, vs −10% in reality).

**Figure 33**



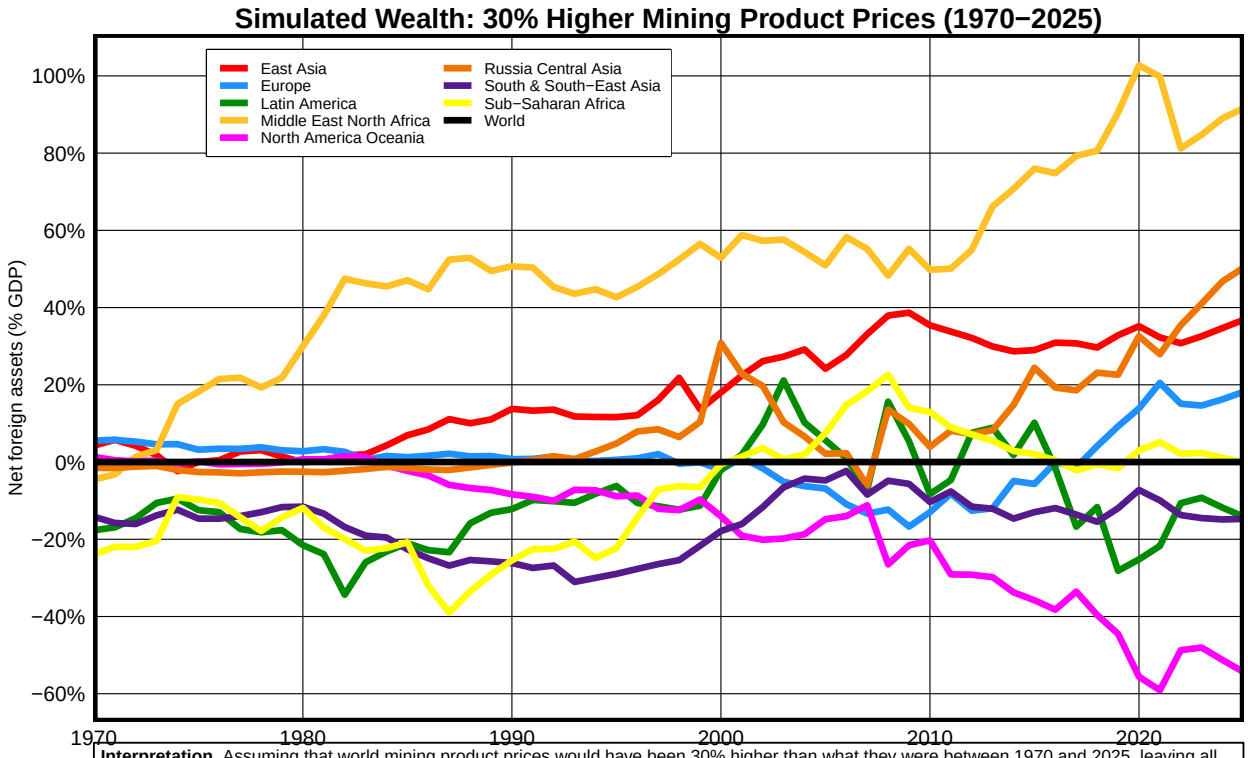

**Interpretation**. We assume that world agricultural product prices would have been 200% higher than what they were between 1970 and 2025, leaving all other flows unchanged. South and South−East Asia would own foreign wealth in 2025, 173%, 130% and 70% of their respective GDP.
**Note**. Russia and Central Asia 1990s indebtness peak is out of scale −507% of its GDP in 1999.

**Figure 34**



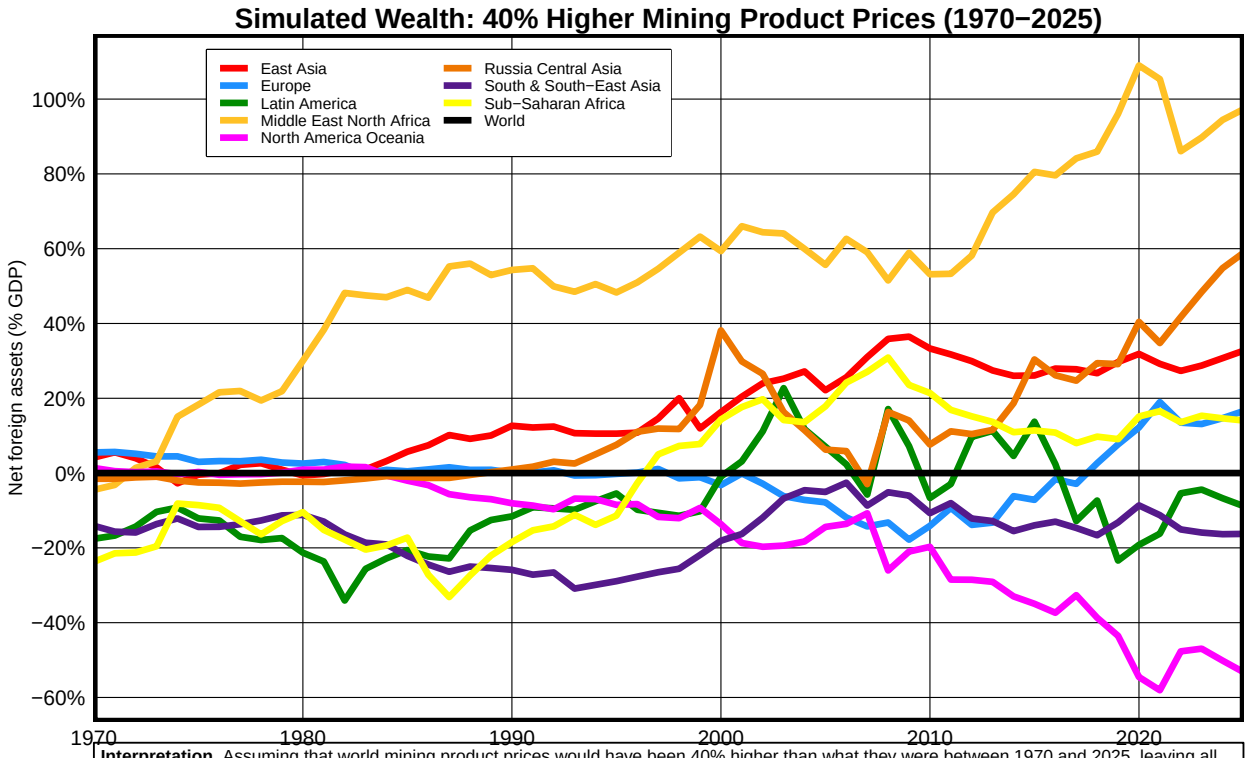

**Interpretation**. We assume that world agricultural product prices would have been 400% higher than what they were between 1970 and 2025, leaving all other flows unchanged. South and South−East Asia would own foreign wealth in 2025, 375%, 303% and 149% of their respective GDP.

**Figure 35**



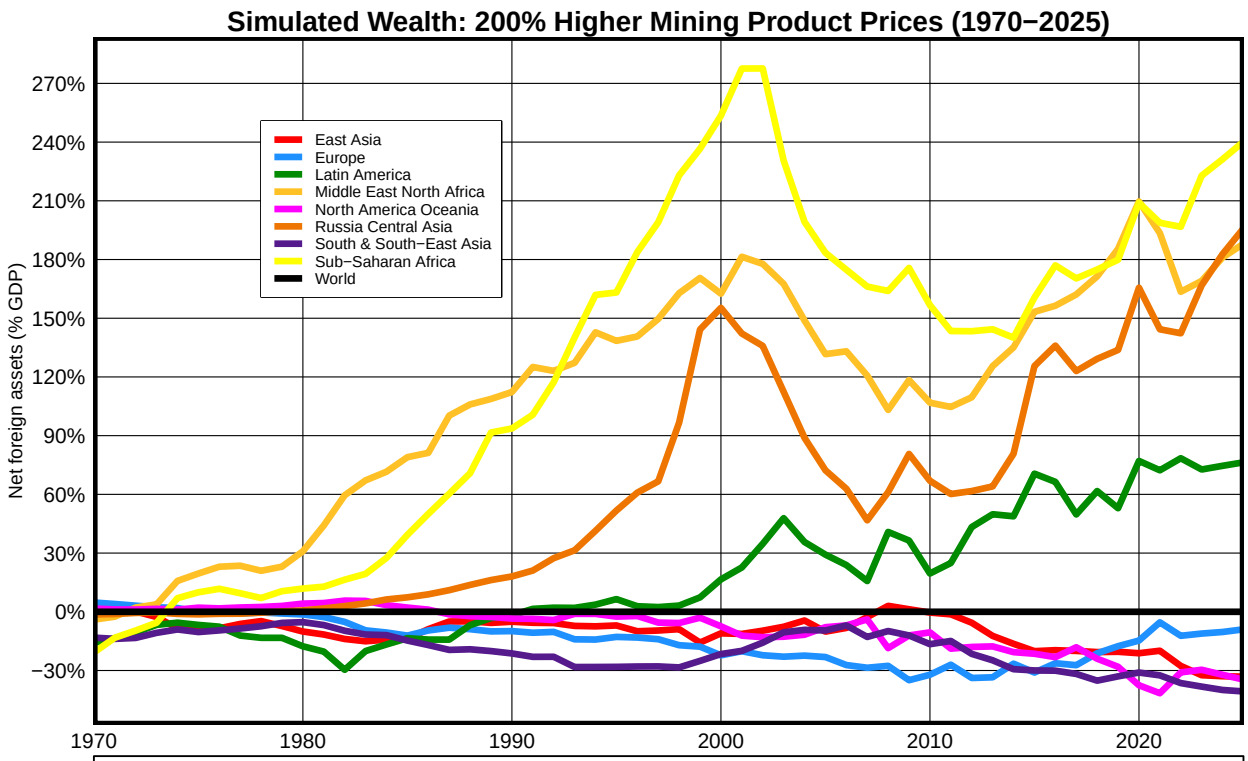

**Interpretation**. Assuming that world mining product prices would have been 30% higher than what they were between 1970 and 2025, leaving all other flows unchanged, the goegraphy of foreign wealth remain similar. Sub−Saharan Africa would own a positive foreign wealth (+3% of its GDP, vs −37% in reality).

**Figure 36**



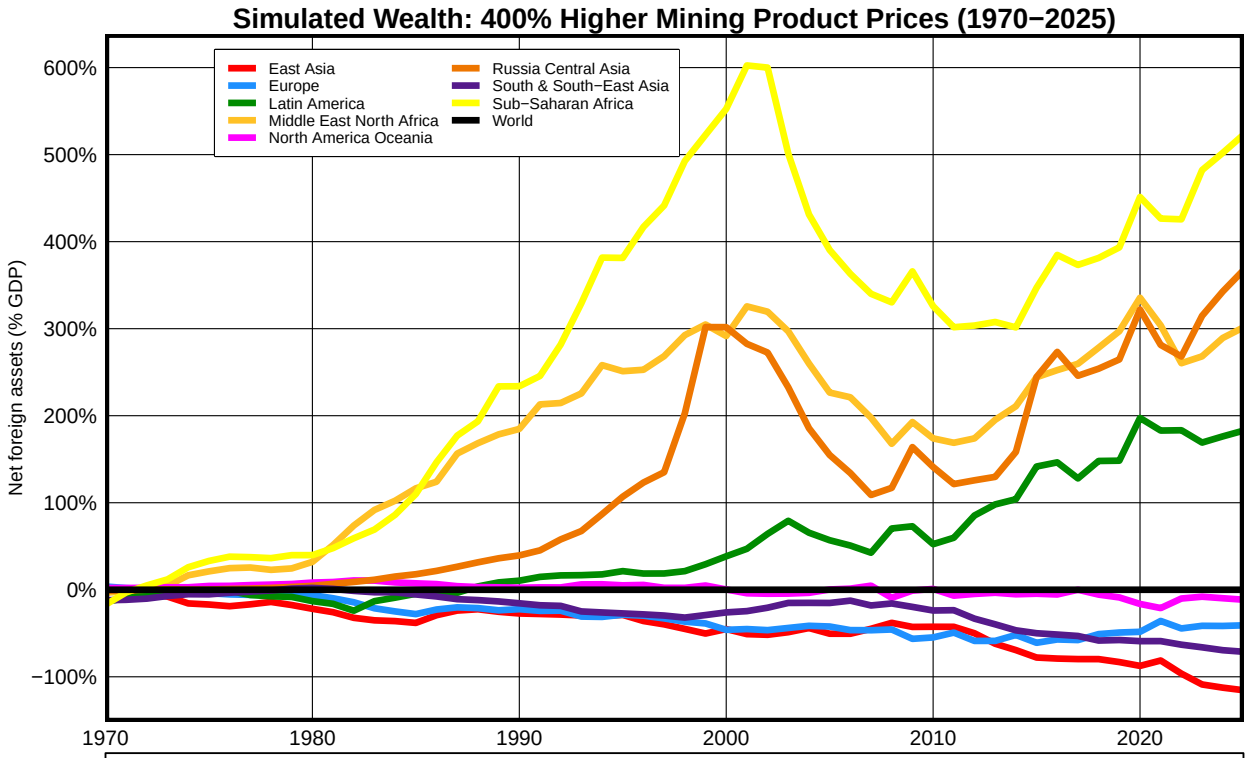

**Interpretation**. Assuming that world mining product prices would have been 40% higher than what they were between 1970 and 2025, leaving all other flows unchanged, the goegraphy of foreign wealth remain similar. Sub−Saharan Africa would own a positive foreign wealth (+14% of its GDP, vs −37% in reality).

**Figure 37**




**Interpretation**. We assume that world mining product prices would have been 200% higher than what they were between 1970 and 2025, leaving all other flows unchanged. Sub−Saharan Africa would own a substantial foreign wealth (+240% of its GDP, vs −37% in reality).

**Figure 38**




**Interpretation**. We assume that world mining product prices would have been 400% higher than what they were between 1970 and 2025, leaving all other flows unchanged. Sub−Saharan Africa would have the bigest shift in its foreign wealth (+523% of its GDP, vs −37% in reality).

## B.4 Per Capita GDP simulations

**Figure 39**

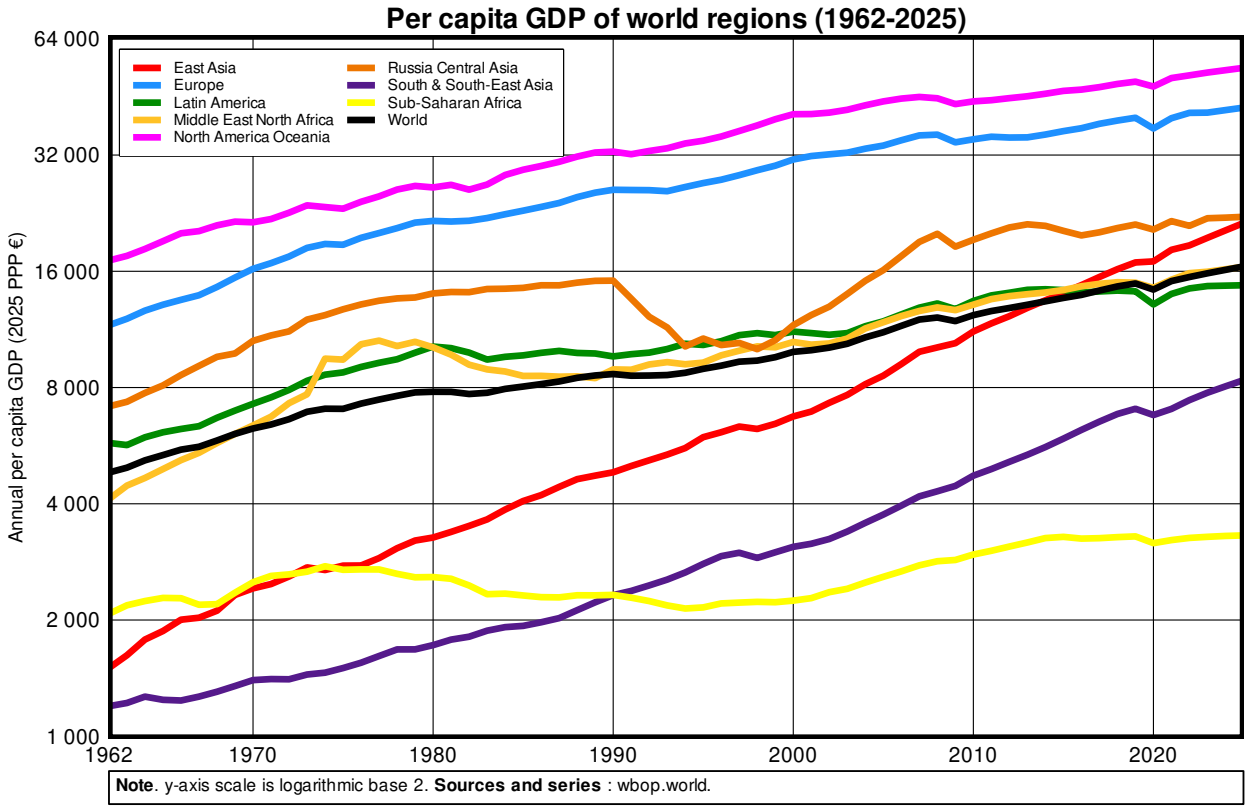
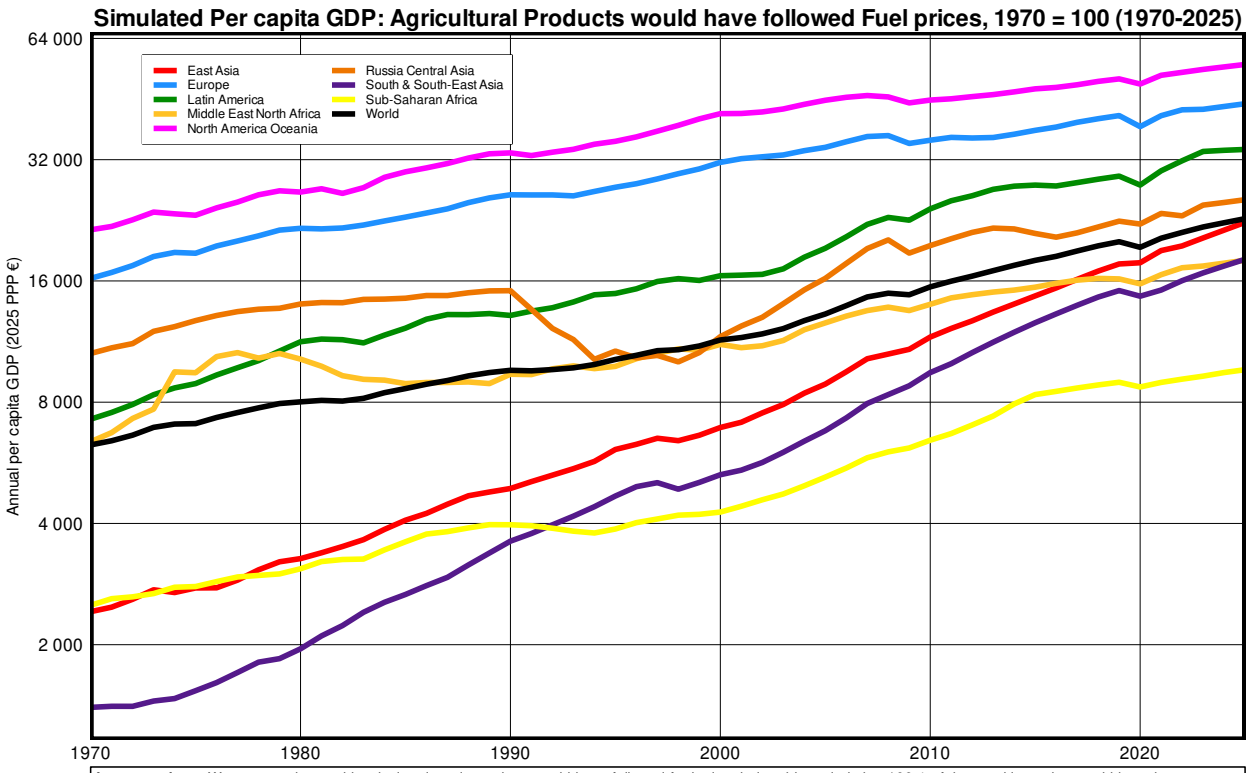
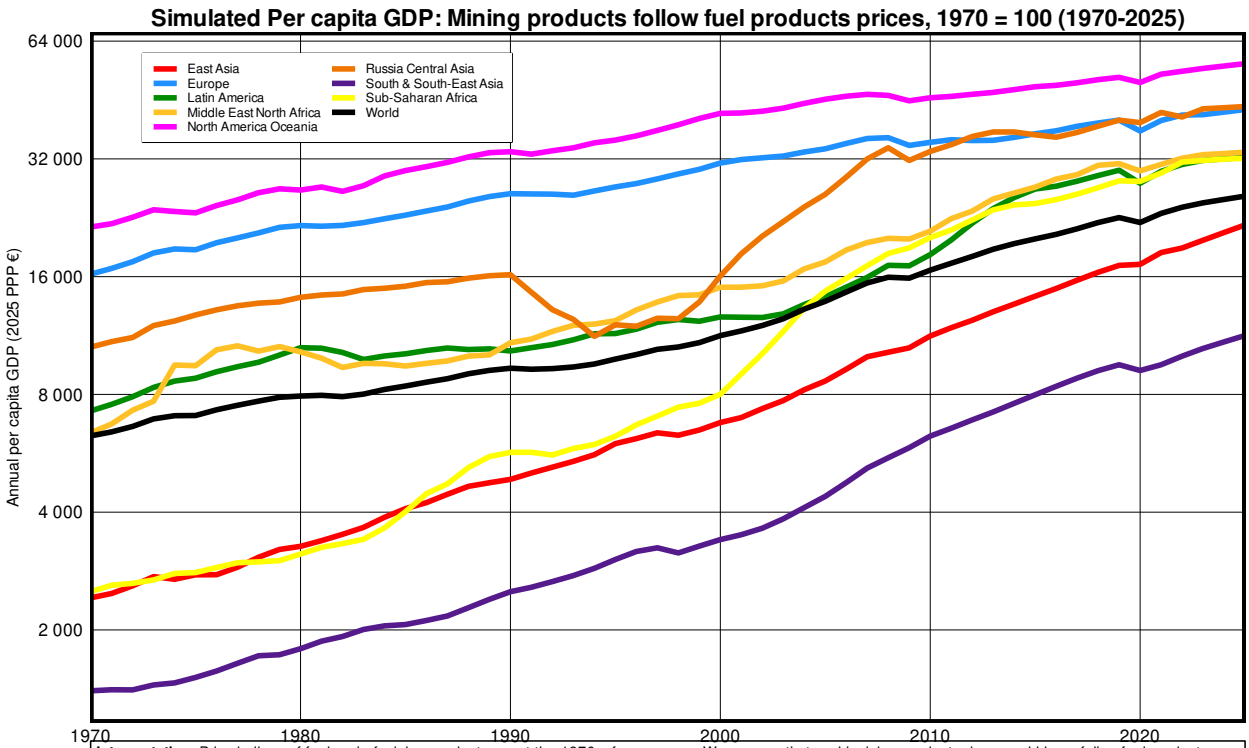


**Figure 40**



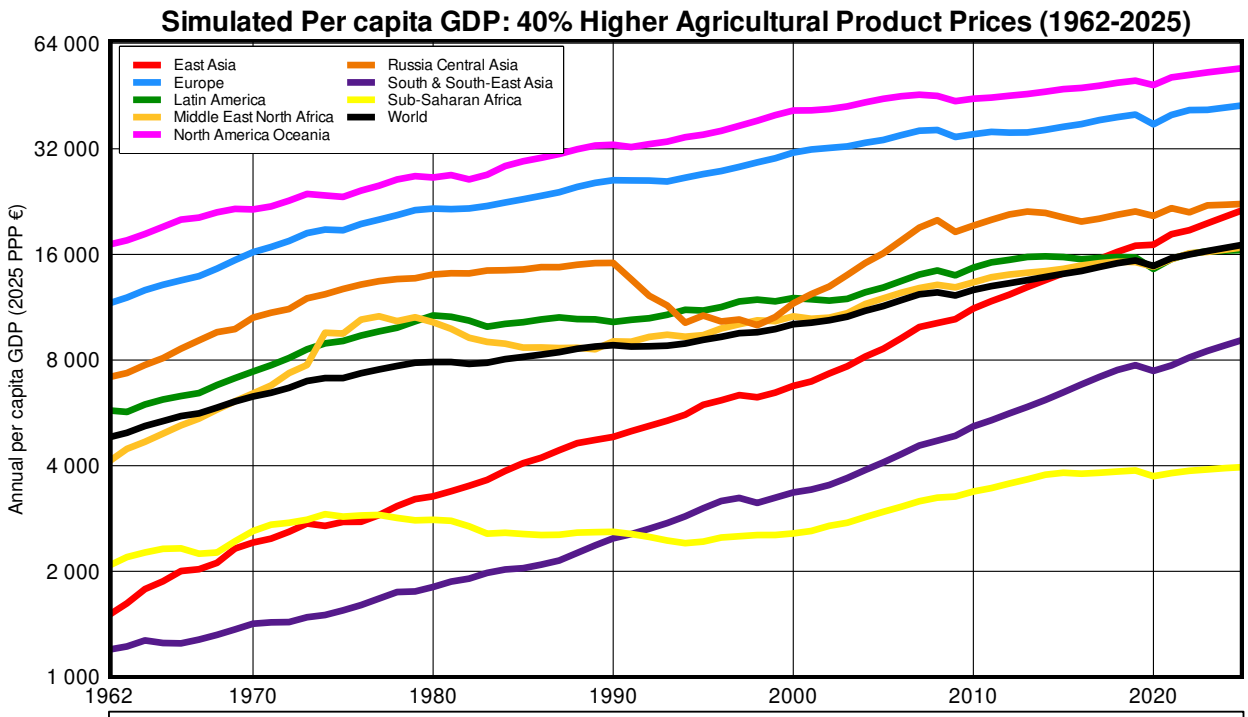

**Interpretation**. : We assume that world agricultural product prices would have followed fuel price during this period, that 100% of the resulting gains would have been invested in domestic human capital by benefiting countries and losses are absorbed by consumption cuts such that their growth path is unaffected. Latin American GDP per capita (34 000 € in 2025) would start converging to European levels (45 000€). **Note**. The y-axis scale is logarithmic base 2.

**Figure 41**



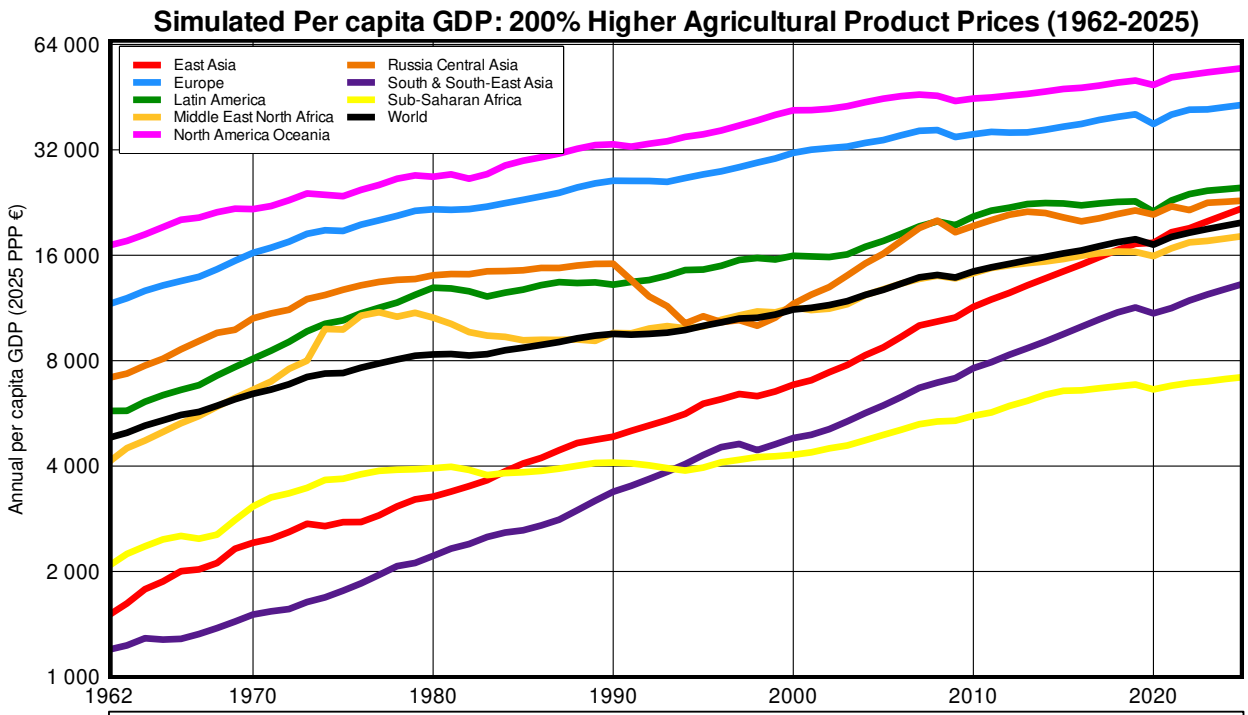

**Interpretation**. Price indices of fuel and of mining products are at the 1970 reference year. We assume that world mining product prices would have follow fuel product prices during this period, that 100% of the resulting gains would have been invested in domestic human capital by benefiting countries and losses are absorbed by consumption cuts such that their growth path is unaffected. Russia and Central Asia GDP per capita would converge to the European level and even outspan it in 2025 (44 000 vs 43 000 €). MENA, Latin America and Sub-Saharan Africa would also take a new path that converge towards the European level (32 000€ in 2025). **Note**. The y-axis scale is logarithmic base 2.

**Figure 42**



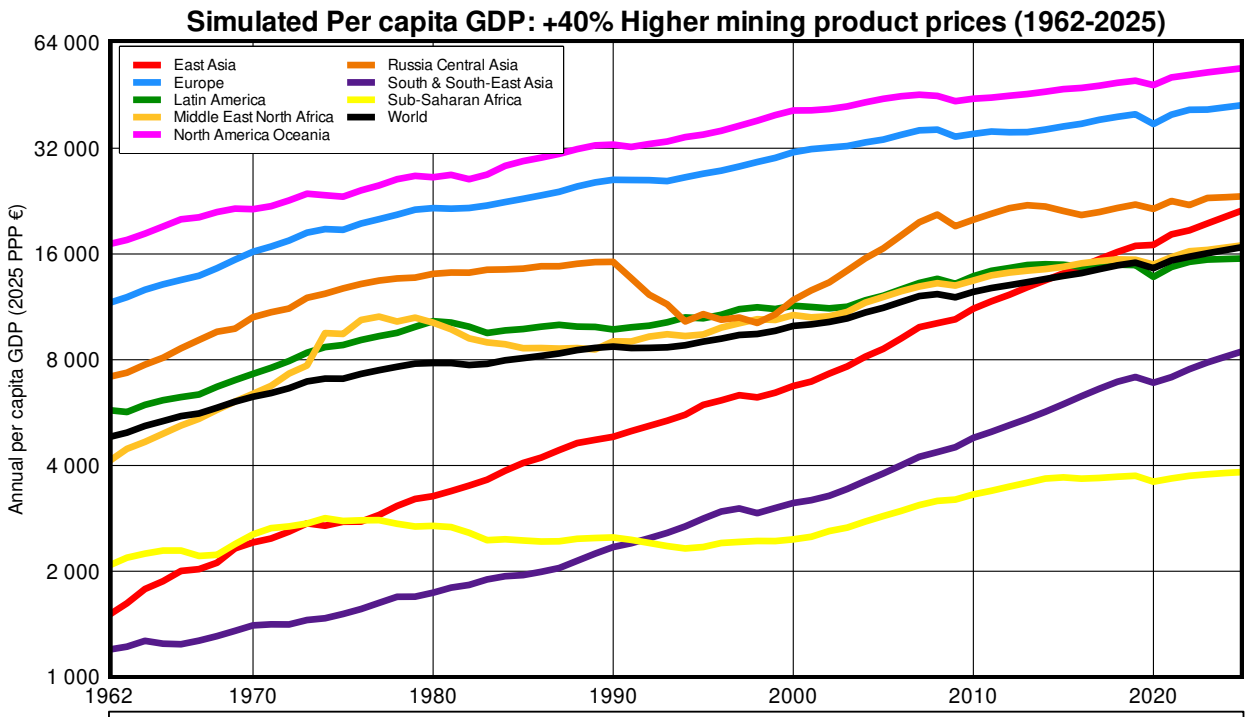

**Interpretation**. : Here we assume that world agricultural product prices would have been 40% higher than what they were in this period and that 100% of the resulting gains would have been invested in domestic human capital by benefiting countries and losses are absorbed by consumption cuts such that their growth path is unaffected. This scenario does not significantly disrupt the growth in per captita GDP in PPP terms across the world. **Note**. The y-axis scale is logarithmic base 2.

**Figure 43**



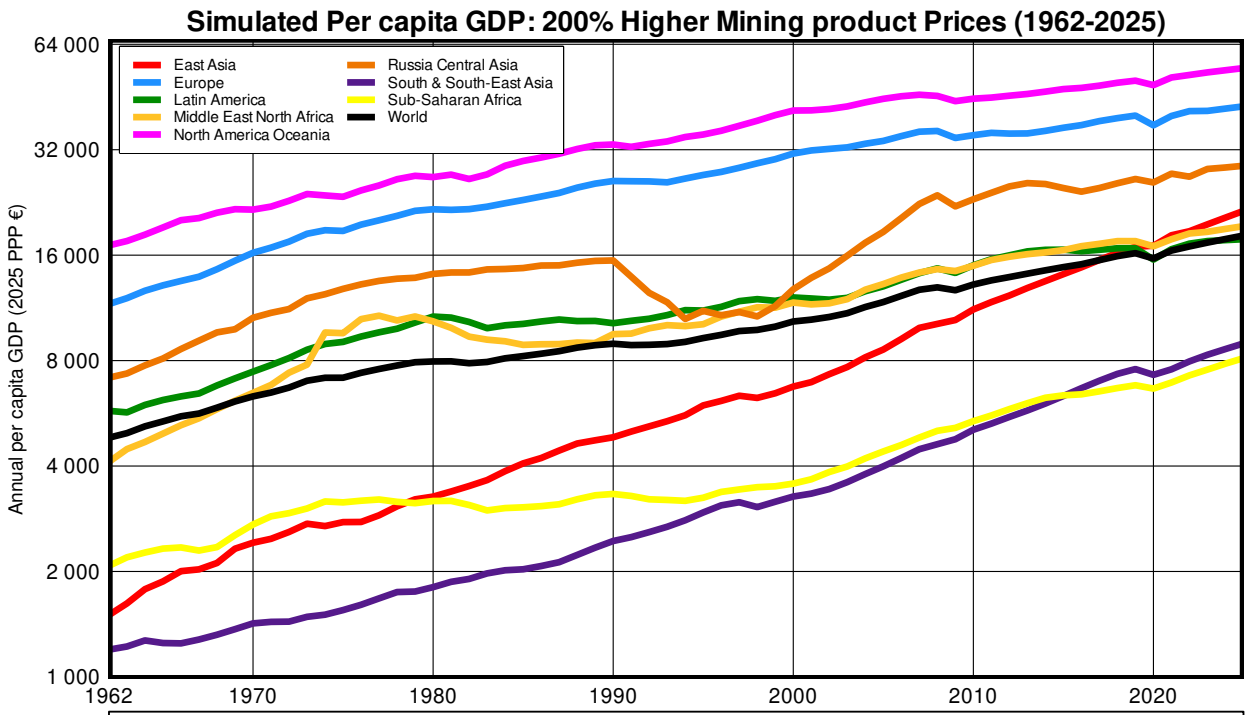

**Interpretation**. : We assume that world agricultural product prices would have been 200% higher than what they were in this period, that 100% of the resulting gains would have been invested in domestic human capital by benefiting countries and losses are absorbed by consumption cuts such that their growth path is unaffected. The main winner is Latin American per capita GDP which increased to join the level of Russia and Central Asia which also improve and would have reached 25 000€ in 2025. **Note**. The y-axis scale is logarithmic base 2.

**Figure 44**



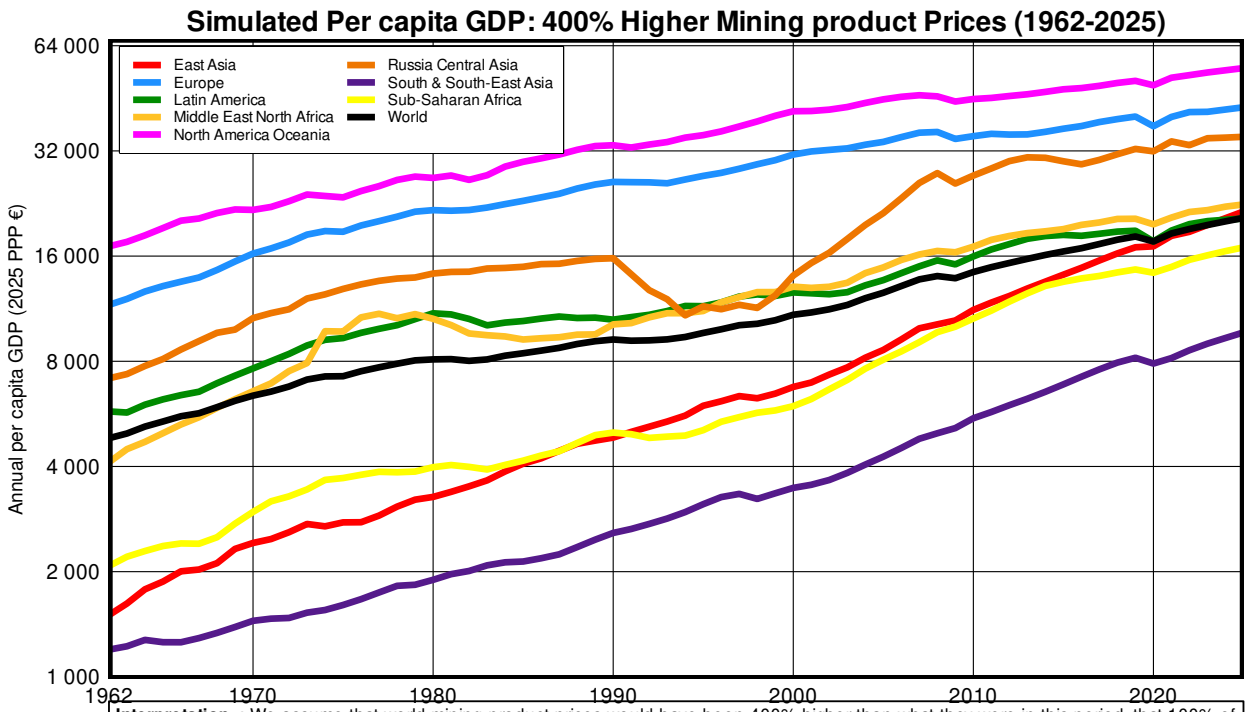

**Interpretation**. : We assume that world mining product prices would have been 40% higher than what they were in this period, that 100% of the resulting gains would have been invested in domestic human capital by benefiting countries and losses are absorbed by consumption cuts such that their growth path is unaffected. This scenario does not significantly disrupt the growth in per captita GDP in PPP terms across the world. **Note**. The y-axis scale is logarithmic base 2.

**Figure 45**



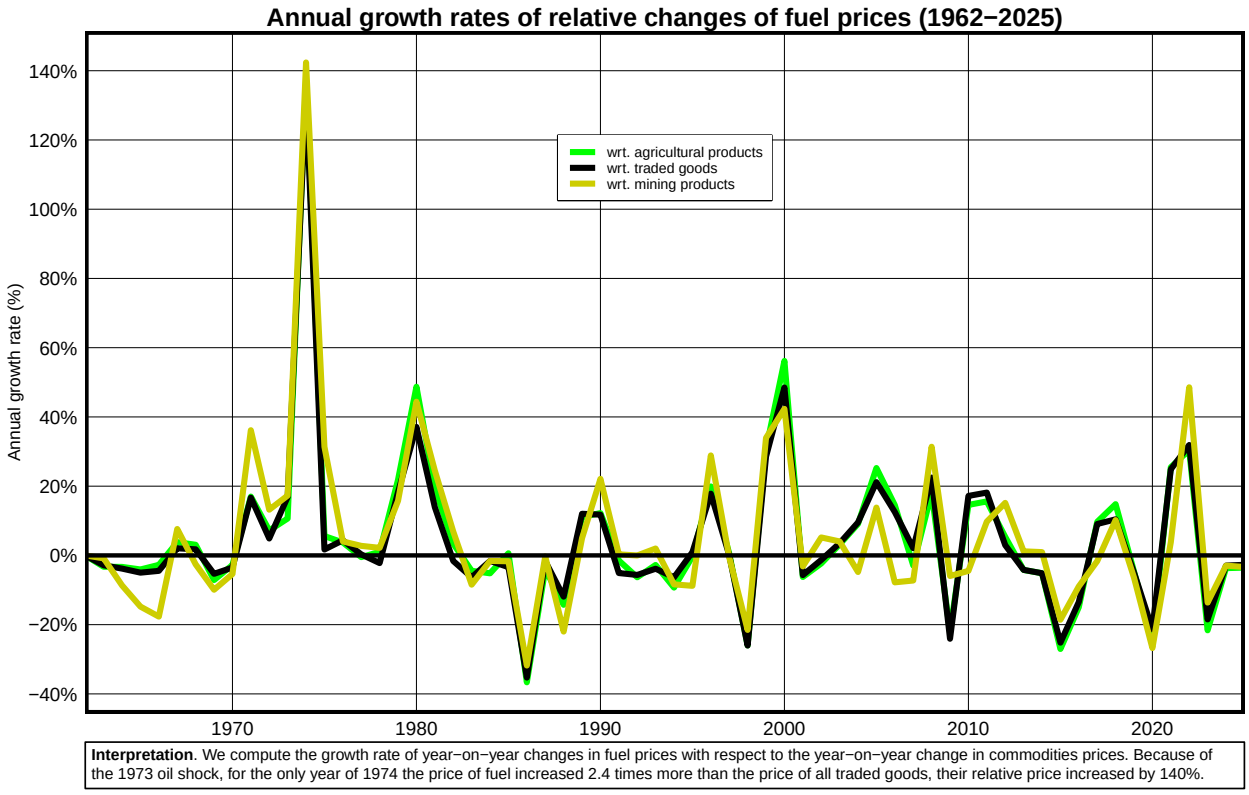

**Interpretation**. : We assume that world mining product prices would have been 200% higher than what they were in this period, that 100% of the resulting gains would have been invested in domestic human capital by benefiting countries and losses are absorbed by consumption cuts such that their growth path is unaffected. This scenario does not significantly disrupt the growth in per captita GDP in PPP terms across the world. **Note**. The y-axis scale is logarithmic base 2.

**Figure 46**



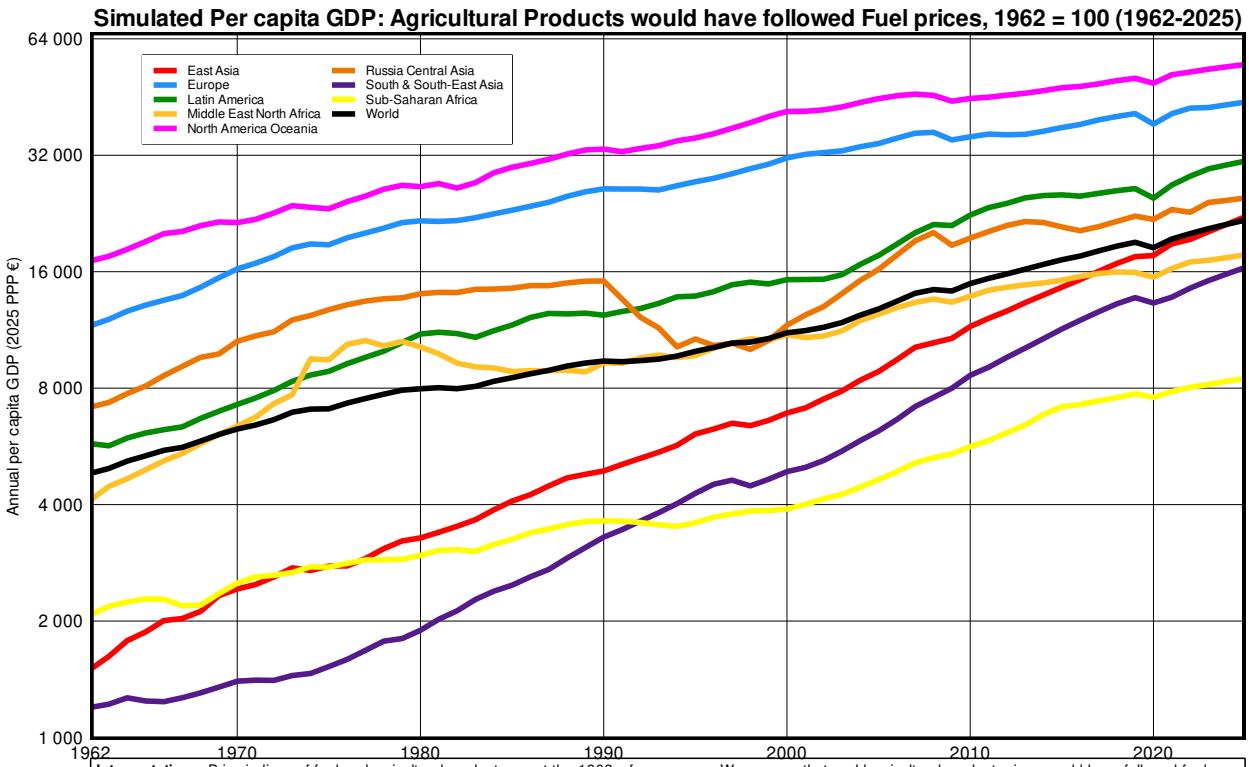

**Interpretation**. : We assume that world mining product prices would have been 400% higher than what they were in this period, that 100% of the resulting gains would have been invested in domestic human capital by benefiting countries and losses are absorbed by consumption cuts such that their growth path is unaffected. This scenario does not significantly disrupt the growth in per captita GDP in PPP terms across the world. However, Sub-Saharan Africa would catch up the level of East Asia and follow their growth trend. **Note**. The y-axis scale is logarithmic base 2.

**Figure 47**



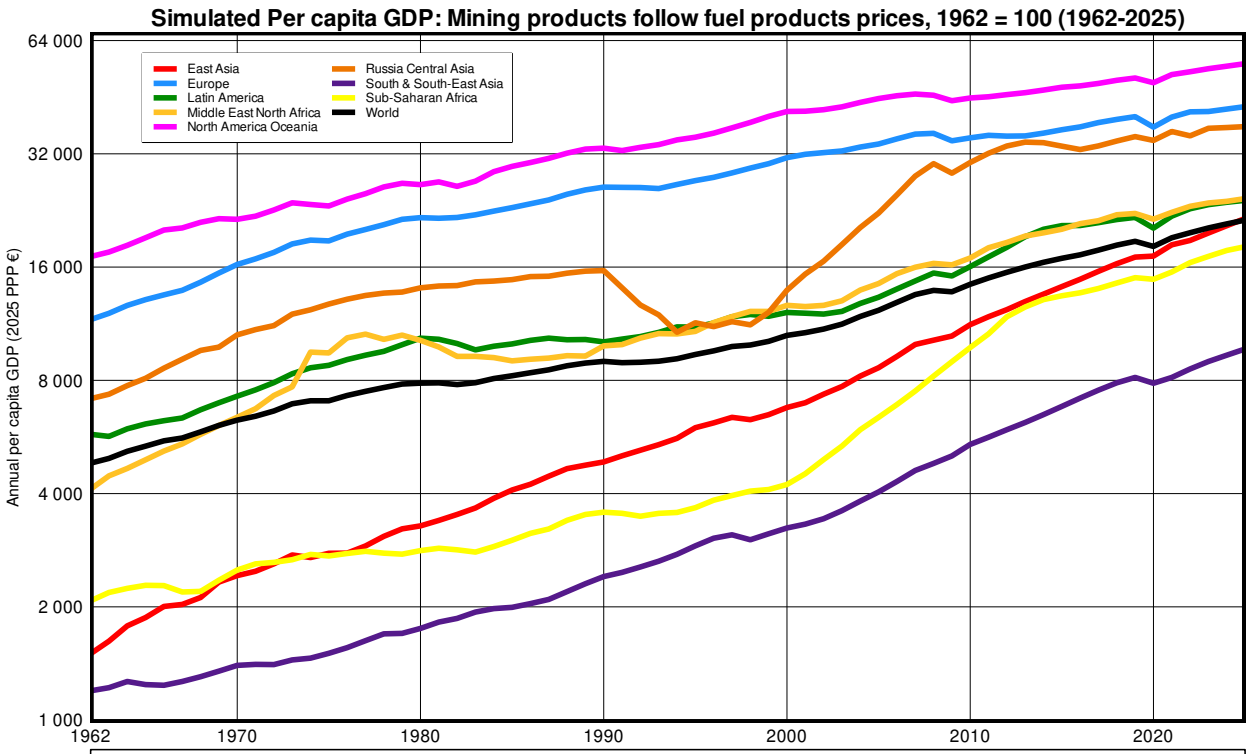

**Interpretation**. We compute the growth rate of year−on−year changes in fuel prices with respect to the year−on−year change in commodities prices. Because of the 1973 oil shock, for the only year of 1974 the price of fuel increased 2.4 times more than the price of all traded goods, their relative price increased by 140%.

Figure 48




**Interpretation**. : Price indices of fuel and agricultural products are at the 1962 reference year. We assume that world agricultural product prices would have followed fuel price during this period, that 100% of the resulting gains would have been invested in domestic human capital by benefiting countries and losses are absorbed by consumption cuts such that their growth path is unaffected. Latin American GDP per capita (38 000 € in 2025) would take a path that converge slowly to European levels (45 000€). **Note**. The y-axis scale is logarithmic base 2.

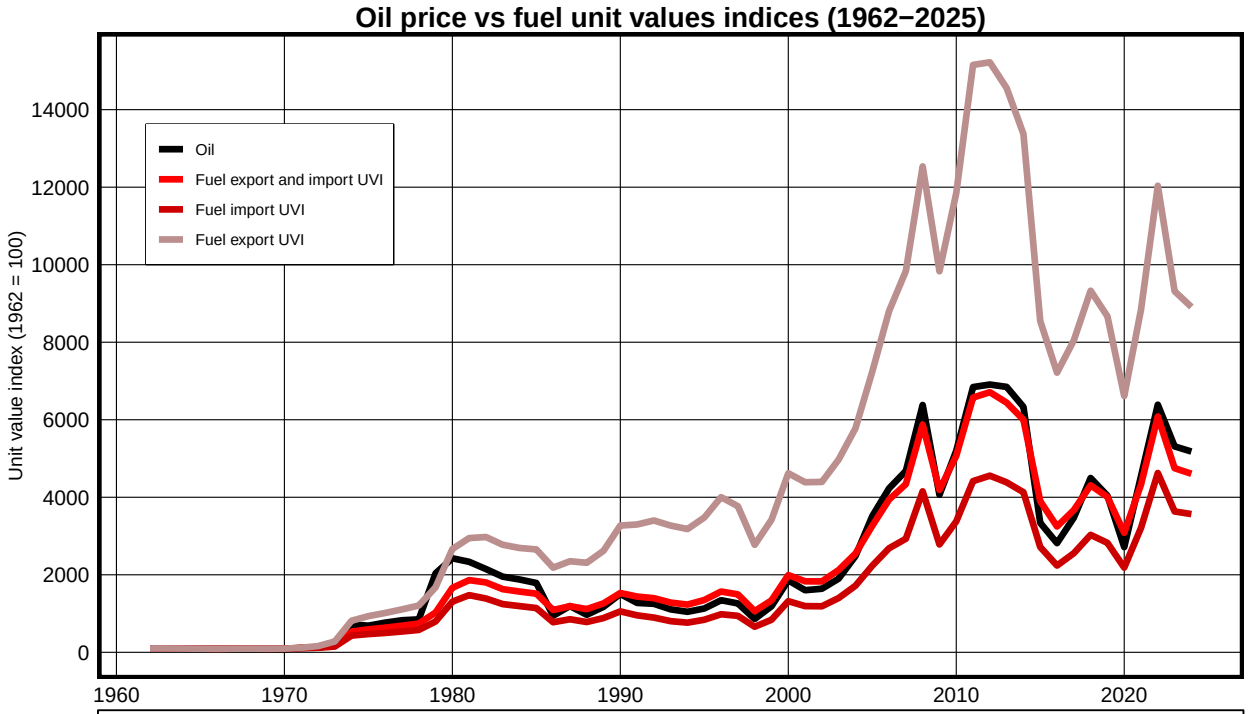
**Figure 49**




**Interpretation**. Price indices of fuel and of mining products are at the 1962 reference year. We assume that world mining product prices would have follow fuel product prices during this period, that 100% of the resulting gains would have been invested in domestic human capital by benefiting countries and losses are absorbed by consumption cuts such that their growth path is unaffected. Russia and Central Asia GDP per capita would converge to the European level (38 000 vs 43 000 €) while most of other regions would converge to a uper-middle income level (20-25 000 €).

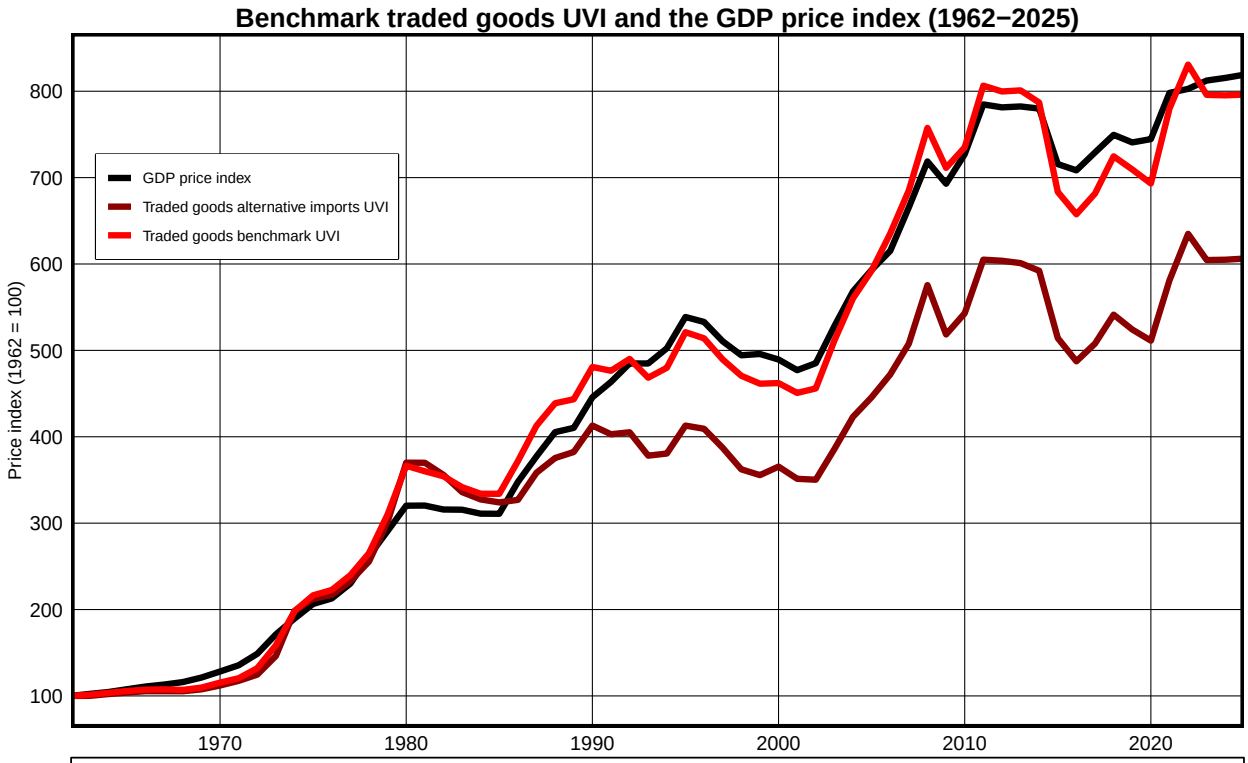
# C UVI Robustness

**Figure 50**



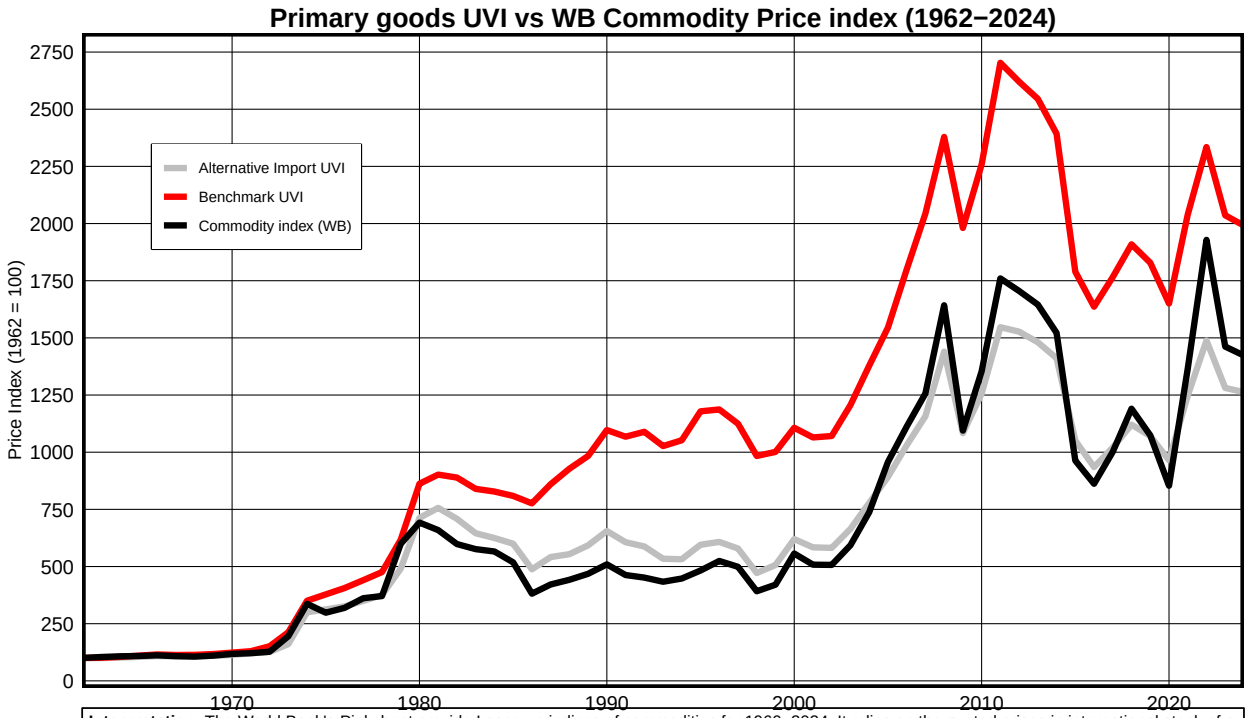

**Interpretation**. For most of the period the number of observations for exports of fuel are bellow 200 observations which could make the estimation more vulnerable to outliers which bring the exports UVI out of scale. We then prefer using the export and import fuel UVI as the reference price for world fuel prices. **Note** Fuel are all 5−digit products included in code 3 in SITC rev. 1. Oil prices in USD/bbl nominal values are found in the Pink Sheet (World Bank), it is an average of crude oil quoted prices in Brent, Dubai and WTI.

**Figure 51**



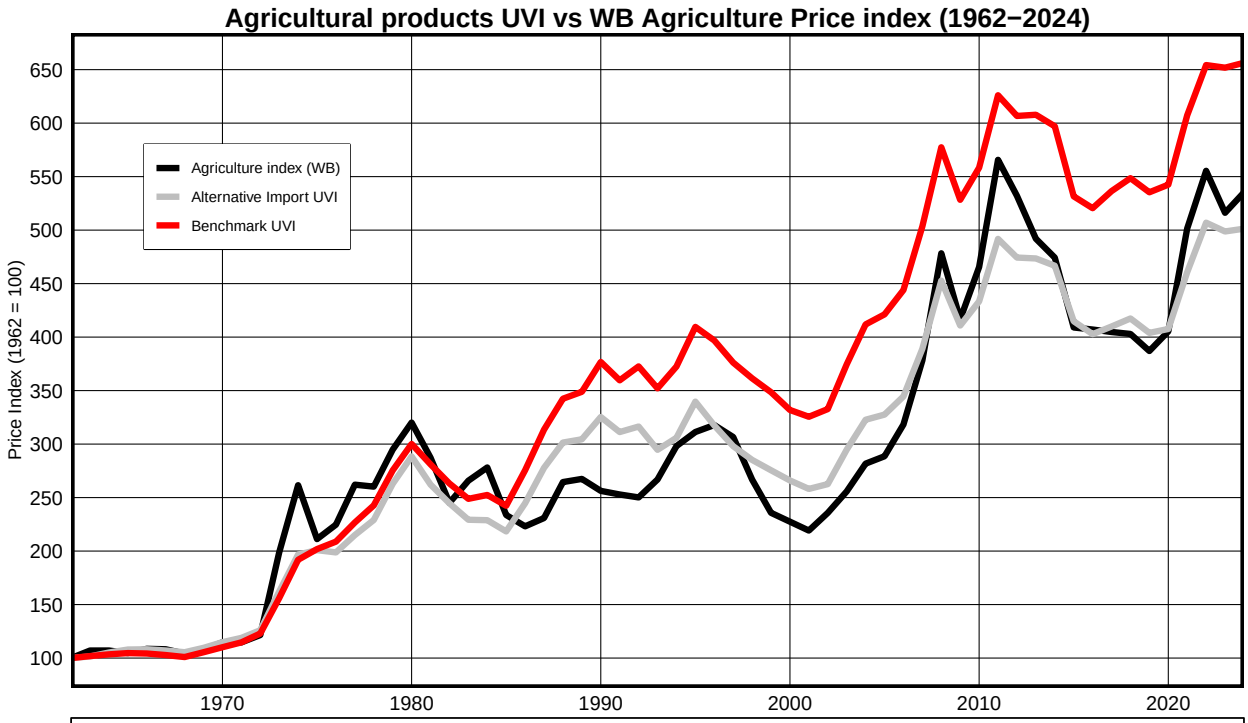

**Interpretation**. The export UVI is the benchmark for world price indices of goods, as it exclude the CIF component, which is a price of services. The GDP price index has a very similar evolution to our price index world traded goods. Even though our benchmark price index does not include prices of trade in service while GDP price index does.

**Figure 52**



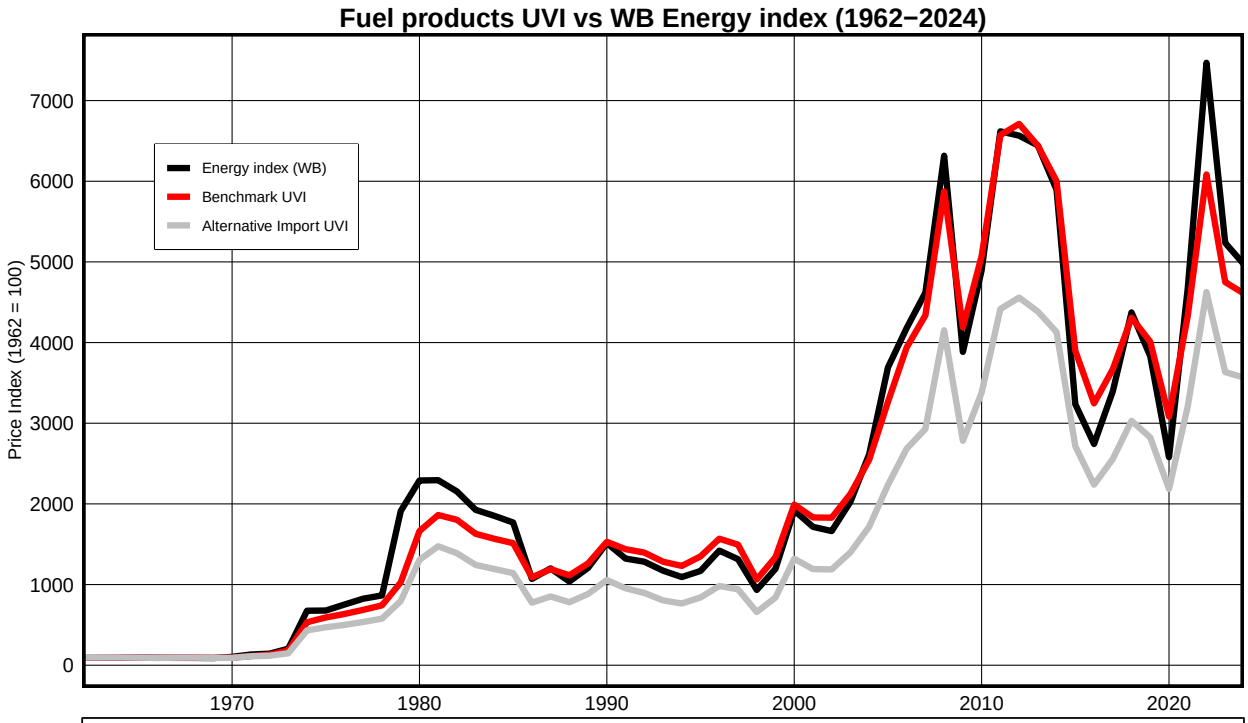

**Interpretation**. The World Bank's Pinksheet provide Laspeyre indices of commodities for 1960−2024. It relies on the quoted prices in international stock of a list of about 45 commodities. Their indices are based on fixed weigths from average export shares in 2002−04 of low and middle income countries (defined in 2006). Our unit value indices are based on rolling weigths of the previous trade share of all reporting countries. Our benchmark UVI is of export unit values only, import UVI is closer to the World bank index. Perhaps, quantity reported for exports are of lesser quality than import, hence will the export UVI be subject to more outliers, not dectected by my algorithm. The main difference with the World Bank, the weights and aggregation of the commodity categories. Fortunately, this the primary UVI is not used in this paper.

**Figure 53**



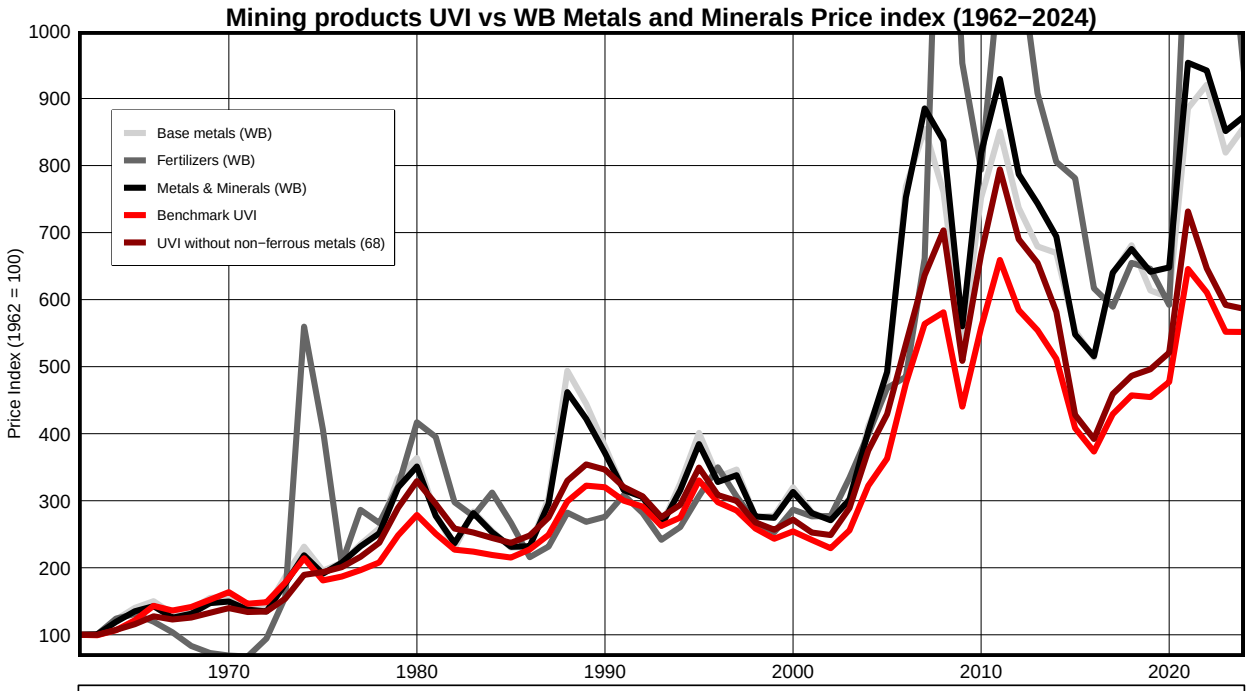

**Interpretation**. The World Bank's Pinksheet provide Laspeyre indices of commodities for 1960−2024. It relies on the quoted prices in international stock of a list of about 45 commodities. Their indices are based on fixed weigths from average export shares in 2002−04 of low and middle income countries (defined in 2006). Our unit value indices are based on rolling weigths of the previous trade share of all reporting countries. Our benchmark UVI is of export unit values only, import UVI is closer to the World bank index. In regard to the differences in weighting and coverage of commodities the overall comparison of the 1962−2024 variations are satisfying. It can still be noted that the price index of agriculture might be overestimated.

**Figure 54**




**Interpretation**. The World Bank's Pinksheet provide Laspeyre indices of commodities for 1960−2024. It relies on the quoted prices in international stock of a list of about 45 commodities. Their indices are based on fixed weigths from average export shares in 2002−04 of low and middle income countries (defined in 2006). Our unit value indices are based on rolling weigths of the previous trade share of all reporting countries. Energy comprise crude oil, coal, and natural gas while our fuel price index include additionally, more diverse petroleum products (33) and electric energy (35). The 1979 seconde oil shock is less sharp for our Benchmark, this could be due to the rolling weghts, but the overall variation is similar.

**Figure 55**




**Interpretation**. The World Bank's Pinksheet provide Laspeyre indices of commodities for 1960−2024. It relies on the quoted prices in international stock of a list of about 45 commodities. Their indices are based on fixed weigths from average export shares in 2002−04 of low and middle income countries (defined in 2006). My unit value indices are based on rolling weigths of the previous trade share of all reporting countries. My mining product UVI include fertilizer while their metals & minerals does not. The Mining product UVI seems to underestime the increase in world prices. It is only slightly explained by the inclusion of nonferrous metals which are semi−manufactured goods in our benchmark UVI and could have benefited more from increases in productivity