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Does real exchange rate devaluation improve participation in global value chains?

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Research Article

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Abstract

Purpose

The undervaluation of the real exchange rate can influence the performance of developing countries' exports and participation in global value chains. Thus, the study aims to investigate the impact of this policy on Egypt's involvement in both backward and forward global value chains, as well as its conventional trade.

Design/methodology/approach:

Utilizing the Autoregressive Distributed Lag model over the period 1990–2022.

Findings:

The results indicate that Currency undervaluation displays a negative impact on Egypt's involvement in global value chains. Consistent with traditional trade theory, undervaluation harms participation in backward GVCs. While the adverse effect on forward linkages may seem inconsistent with traditional trade theory. Nevertheless, this outcome aligns with the fundamental notion that domestic and foreign value-added in GVCs are complementary in the production process; consequently, the rising cost of imported intermediate inputs results in a reduction in output and exports. Regarding the effect of undervaluation on conventional trade, the results indicate that devaluation with digitalization policies has a beneficial impact on trade, as it increases exports and decreases imports.

Originality/value–

The paper builds on previous empirical work in this field and fills a knowledge gap by examining the impact of devaluation on Egypt's GVCs involvement and conventional trade. The study's findings could potentially spur policymakers to maintain currency stability, develop strategies and policies to foster innovation and localize technology, reforming educational systems to align with labor market demands, Improving institutional quality and reducing administrative burdens, maximizing commercial representation in African markets.

1. Introduction

Exchange rate fluctuations are often asserted to significantly impact export quantities, where undervaluation helps developing economies with substantial manufacturing sectors overcome the constraints of limited export competitiveness by making their exports comparatively less expensive and thus more competitive [69]. Nonetheless, new patterns of international commerce, such as the expansion of global value chains (GVCs), complicate the impact of currency rates on trade more than previously observed, where traditional theory fails to differentiate between trade in final goods and services and trade in intermediate materials, presuming that countries exclusively export final commodities that do not necessitate imported intermediate materials. This may either devalue or overvalue the effect of exchange rate undervaluation on trade flows, as enhanced integration into GVCs and an increased proportion of Foreign Value Added (FVA) in export production are anticipated to mitigate the effects of undervaluation on export performance. An undervaluation results in heightened costs for imported inputs, thereby diminishing the competitive advantages of currency undervaluation relative to the conventional scenario without GVCs [19]. Since engagement in GVCs fosters both economic growth and structural transformation. Where participating countries can engage in specific segments of the production chain without the need to manufacture the entire product [31; 32], so, this study aims to enhance the existing literature on developing economies by evaluating the impact of real exchange rate (RER) undervaluation, alongside other determinants of GVCs, on Egypt's participation in GVCs, while also comparing this effect to that of RER undervaluation on Egypt's traditional trade. Egypt presents a compelling case for examination, representing an emerging economy that remains inadequately connected to GVCs, despite possessing several trade agreements and significant potential due to its proximity to major markets and labor abundance [9], as well as significant alterations in its exchange rate system. To our knowledge, no research directly examines the effect of undervaluation on Egypt's GVCs involvement and compares it with Egypt's conventional trade. Our research bridges two areas of literature: the impact of devaluation on conventional trade and its influence on GVCs, with a focus on the role of institutions and digitalization in participation.

Recent studies emphasize the significant impact of undervaluation as a primary catalyst for export-driven economic growth in multiple economies. As [52; 1; 33; 63; 55; and 11]. Regarding participation in the GVCs, [29; and 30] suggest that digital adoption enhances trade performance and, consequently, fosters participation in GVCs. [4] suggest that the undervaluation of the RER may affect a country's national export performance and participation in GVCs, emphasizing the importance of institutional quality and digital adoption. Nevertheless, there is a scarcity of research investigating the influence of undervaluation on the involvement of developing countries in GVCs, while considering these factors. So the study assesses the impact of the undervaluation of the RER on Egypt's traditional trade and its participation in GVCs through domestic value added (DVX) in exports, which denotes to the value added included in the exports of other nations (forward linkages) and FVA in exports, representing the value added in exports produced by foreign industries (backward participation), from 1990 to 2022, utilizing the Autoregressive Distributed Lag (ARDL) cointegration model.

The results indicate that Currency devaluation exerts a harmful effect on these two methods of engaging in GVCs. The empirical results indicate that, consistent with traditional trade theory, undervaluation harms participation in backward GVCs. While the adverse effect on forward linkages may seem inconsistent with traditional trade theory. Nevertheless, this outcome aligns with the fundamental notion that domestic value-added exports (DVA) and FVA in GVCs are complementary in the production process—consequently, the rising cost of imported intermediate inputs results in a reduction in output and exports. The interaction between local and FVA reinforces the detrimental effect of undervaluation on involvement in backward GVCs. Accounting for digitalization, we demonstrate that undervaluation amplifies the negative impact on backward participation. To guarantee the robustness of results, we conduct four additional analyses by sector. These supplementary analyses yield the same results, thereby strengthening the validity of our findings.

Regarding the effect of undervaluation on conventional trade, the results indicate that digitalization has a beneficial impact on trade, as it increases exports and decreases imports through RER devaluation.

The paper's roadmap is organized as follows. Section 2 presents the theoretical framework, and Section 3 provides a review of the literature. Section 4 presents some stylized facts about Egypt's exchange rate and conventional trade. Section 5 presents Egypt's participation in GVCs. Section 6 explains the methodology. Section 7 presents empirical results. Section 8 provides the conclusions and recommendations.

2. Theoretical framework

Historically, exchange rate misalignment has been viewed as a tool for governments to facilitate industrialization and enhance welfare [64]. According to the Mundell-Fleming paradigm, fluctuations in exchange rates lead to alterations in relative prices, which in turn influence the demand and supply of tradable goods, thereby prompting adjustments in the quantities of exports and imports. Through expenditure switching effects -the reactions of export and import quantities to variations in the prices of tradable products in relation to non-tradable commodities- [7].

[72] has been posited that the RER may need to drop significantly, surpassing its final equilibrium value, to render the unconventional export industry an attractive investment opportunity. The aim is to enhance the previously restricted ability to export manufactured goods and other non-traditional items, thereby providing exporters with a competitive advantage in the global market. With limited exceptions, the empirical research robustly supports this perspective, indicating that RER undervaluation enhances exports and economic growth. In contrast, overestimating diminishes the competitiveness of exports and hampers economic growth. This evidence aligns with [69], who asserts that in developing countries with sizable manufacturing sectors, central banks are likely to have an impact on exchange rate policy. Undervaluation facilitates developing economies addressing the constraints associated with limited export competitiveness by rendering their exports comparatively less expensive and thus more competitive [39]. The beneficial effects of undervaluation depend on various circumstances, including the magnitude of the manufacturing sector and the robustness of the industrial or agricultural sectors [4].

In the framework of GVCs trade, these theoretical foundations do not automatically apply, whereby nations' cross-border interactions increasingly involve importing intermediate commodities, enhancing their value, and subsequently re-exporting them. [70; 21] argue that a devaluation of the currency would lead to increased expenses for imported inputs required for the production of advanced goods, such as equipment and machines. An overvaluation of the domestic currency would diminish the expenses associated with imported inputs, hence promoting export diversification. Examine the scenario of a unilateral depreciation. This shock enhances competitiveness and increases exports, as predicted by traditional trade theory. Nonetheless, backward GVCs integration leads to increased marginal costs for exporters due to depreciation. An undervaluation results in a rise in the expense of imported inputs, hence diminishing competitiveness and the export quantity response compared to the "traditional" route. On the import side, the depreciation typically redirects demand from imports to domestically produced items. GVCs' integration via forward linkages boosts the competitiveness of exported commodities. Industries that are significant exporters are also substantial importers, so elevating the demand for imported inputs required for their production and consequently mitigating the import quantity response compared to the conventional scenario. Therefore, a GVCs-associated exchange rate shock via backward linkages functions as a supply shifter, as it influences exporters' marginal production costs. A GVCs-correlated exchange rate shock via forward linkages functions as a demand shifter, as it influences the competitiveness of imports that are re-exported to downstream purchasers [19; 7]. Consequently, sustaining an undervalued RER requires the government to pursue a reasonably prudent fiscal policy. In this context, literature indicates that mild undervaluation is a potent policy tool. If it exceeds a specific threshold, it may have a detrimental effect on export performance, hinder growth, and diminish the current welfare of the national community [4].

[26] demonstrate that RER appreciation diminishes DVA, consistent with traditional trade theory, while simultaneously reducing FVA imports, therefore refuting this theory. This is associated with the idea of complementarity between DVA in production and GVC-related FVA. Thus, a reduction in DVA exports indicates a decline in the demand for imported FVA. The degree of this response is contingent upon the ratio of FVA in exports. An FVA export percentage surpassing 60 percent results in a transition of import and export elasticities from negative to positive, signifying an augmentation in both DVA and FVA due to currency appreciation.

When evaluating the conditional impact of RER concerning institutional quality and the extent of digitalization. Literature offers substantial proof that the advantageous impacts of undervaluation on trade flows or economic growth are intensified in nations with fragile institutions and widespread market failures [56] it is asserted that advanced products necessitate greater connection and contract intensity compared to primary goods. Fragile institutions in a nation put implicit tariffs on exports that rely heavily on relationships and contracts, in contrast to fundamental commodities. Consequently, currency undervaluation mitigates implicit taxes, thereby enhancing the competitiveness of manufactured and advanced exports. In the realm of digitalization, these technologies not only facilitate access to information but also orchestrate complex production processes spread across various geographical locations, enabling producers to interact with customers, suppliers, distributors, and employees irrespective of their physical location [27; 42]. Moreover, telecommunications are essential for facilitating the outsourcing of complex production processes internationally, as the Internet enhances access to rapid and precise information regarding diverse economic agents and market conditions, allowing enterprises to pursue international expansion [57]. The advantageous impacts of undervaluation are likely to be amplified by expanded Internet accessibility. The use of the Internet diminishes transaction costs and mitigates information asymmetries, so fostering an optimal environment for production, irrespective of institutional quality. The Internet diminishes the costs related to finding an expensive intermediary, which is crucial for facilitating commercial exchanges [36]. Finally, Internet connection facilitates rapid international exchanges among companies and offers an economical method for engaging in global marketplaces [50]. Consequently, the benefits derived from undervaluation are expected to exert a more significant influence with enhanced Internet accessibility.

3. Literature review

This paper examines two primary strands of literature. Initially, we investigate research that assesses the influence of exchange rate misalignment on traditional trade performance. Secondly, the effect of undervaluation on GVCs' involvement, as well as the impact of institutional quality and digitalization.

3.1 The impact of RER misalignment on conventional trade.

Recent studies underscore the pivotal significance of undervaluation as a primary catalyst for export-driven economic growth in diverse economies. Proposing that exchange rate undervaluation enhances exports and economic growth, whereas overvaluation diminishes the competitiveness of exports across the economy and hampers overall growth.[59] Analyzed the correlation between the RER and trade balance in Malaysia from 1955 to 2006, employing Engle-Granger's cointegration methods and the Vector Error Correction Model. The results indicate that devaluation can improve the trade balance over the long term. [23] analyzed the effects of RER misalignment on the export competitiveness of Egypt, Morocco, and Tunisia from 1980 to 2009. The results indicate that the comparative elasticity of the exchange rate systems in Morocco and Tunisia led to a declining trend in the Real Effective Exchange Rate (REER), thereby enhancing the pricing competitiveness of exports. Conversely, Egypt has seen prolonged phases of misalignment, as the overvaluation of the Real Effective Exchange Rate (REER) from the mid-1990s to the late 2000s negatively impacted the country's export competitiveness. [33] utilize a dataset encompassing four nations (Egypt, Jordan, Kuwait, and Yemen) to evaluate whether RER undervaluation influences both the volume of exports (intensive margin) and the likelihood of exporting specific products to designated destinations (extensive margin). The results indicate that RER depreciation enhances exports at both the intensive and extensive margins.

[52] indicate that, based on annual data from 60 economies between 1980 and 2014, a 10% real effective depreciation of a currency correlates with an average increase in real net exports of 1.5% of gross domestic product (GDP). [25] performed a study to investigate the influence of the dollar's ($) devaluation on enhancing the United States' (US) trade balance, utilizing quarterly data from 1999 to 2015, and used the ARDL cointegration model. Furthermore, concentrate on nine distinct areas of business services. The results indicate that the depreciation of the US dollar will have a positive impact on US exports in the future. Nonetheless, not all service classifications analyzed will gain from this depreciation.

[1] analyzed the effects of currency mismatch in China on macroeconomic variables of China and its primary 30 trade partners, utilizing data from 1992 to 2017. The weakening of China's currency was found to enhance its exports while having an adverse effect on its imports. [63] examined the relationship between RER misalignment and trade balance for the BRICS countries from 1990 to 2016. The results suggest that the overestimation of currencies led to a weakening in trade balance, whereas undervaluation developed it. [55] Assess the effect of currency misalignment on the trade balance of 21 emerging economies during the period 1980–2016, using the Generalized Method of Moments (GMM) model. The study indicates that undervaluation improves the trade balance. [11] Investigate the influence of exchange rate changes on trade flows among East Asian countries from 1990 to 2021, using a panel pooled mean group (PMG) estimator. Findings indicate that the real depreciation of the exchange rate yields substantial long-term benefits for trade flows.

While some studies have found adverse effects of exchange rate devaluation on exports, [54] indicated that devaluation mostly advantages countries that are inherently export-oriented prior to currency fluctuations, while import-dependent economies struggle to derive benefits from such currency changes. [65] Investigate the correlation between exchange rate devaluations and export performance in a sample of nine economies, all characterized by floating exchange rate regimes, from 1990 to 2009. Their findings, derived from panel data - fixed effects- models, indicated that a depreciated exchange rate does not inherently enhance export performance. Conversely, export expansion correlates with more robust exchange rates. [12] Examined the effects of RER devaluation on the current account balance of four low-income countries in East Africa: Ethiopia, Kenya, Rwanda, and Tanzania. The PMG approach is utilized to analyze panel data during the period 1970–2016. The findings suggest that a depreciation of the RER has no significant current or long-term influence on the current account balance. This is mostly attributable to the concentration of exports from these nations in a narrow spectrum of agricultural commodities and natural resources. [62] analyze the effects of RER undervaluation on Indonesia's manufacturing exports across 22 industries from 1990 to 2015, employing the augmented mean group methodology. The findings demonstrate that fluctuations in the actual exchange rate, whether depreciation or appreciation, have a minimal impact on Indonesia's industrial exports. [61] Examines the influence of RER misalignment on Morocco's trade balance relative to its primary partner, the European Union (EU), from 1980 to 2021, utilizing an estimated error correction model (ECM). The results demonstrate that, notwithstanding depreciation, the long-term influence of the exchange rate on encouraging economic growth via the exports channel does not yield the anticipated positive impacts on trade volume.

Regarding the literature examining the influence of the currency rate on exports in Egypt, [2] investigates the J-curve phenomenon in Egypt from 1989 to 2010. Employing the ARDL bounds testing methodology reveals that devaluation has a negative impact on the trade balance in the short run. However, the desired effect of these reductions—an enhancement in export competitiveness—will only materialize over an extended period. [15] Investigated the impact of exchange rate risk on Egypt's trade with the U.S. They discovered an indication of favorable long-term connections, indicating that exports rise in response to heightened exchange rate risk. [16] analyzed the impact of exchange rate volatility (ERV) on Egypt's trade with the EU, using cointegration analysis on data from 1994Q1 to 2007Q4 across 59 industries. Discovered that, in the long term, a significant number of industries (24 out of 59 for imports and 28 out of 59 for exports) encountered reductions in trade flows due to heightened exchange rate risk, especially in the oil, gas, and large-scale industries. Consequently, the authors advocated for prompt measures to stabilize the Egyptian pound against the Euro. [13] aim to evaluate the influence of ERV on the export and import functions concerning Egypt's principal trading partners from 1980 to 2016, using the ARDL model. The results indicate a substantial negative correlation between volatility and exports. This data corroborates the conventional perspective that increased volatility will lead to diminished exports. [76] Analyze the effect of exchange rate devaluation on both the intense and extended margins of trade in Egypt, using monthly firm-level and sector-level data from 2005 to 2016. The findings indicate that a depreciation of the RER enhances the value of exports without altering their quantity. At the sectoral level, the most advantageous products include fruits and vegetables, clothes, textiles, mineral fuels and oils, and certain chemical products.

[6] Verify the validity of the Marshall–Lerner (M-L) condition in Egypt's trade balances from 1965 to 2017 using the ordinary least squares (OLS) approach. The result indicates that, despite the devaluation, imports seem to be on the rise, indicating a substantial issue in the trade balance that must be resolved in

order to transform the deficit into a surplus. [67] aims to evaluate the validity of the M-L condition between Egypt and BRICS nations to identify industries that will gain from long-term currency depreciation by picking 69 commodities and employing the ARDL bounds test for the period 2001–2022. The findings demonstrate that the M-L condition is not satisfied at the bilateral trade level. At the commodity level, the M-L condition is satisfied in just 8 of 69 industries. Which are Sugars and sugar confectionery, Tanning or dyeing extracts, Man-made staple fibers, Articles of apparel and clothing, Natural or cultured pearls, precious, Zinc and articles thereof, Nuclear reactors, boilers, machinery, Miscellaneous manufactured.

3.2 The effect of undervaluation on GVCs' involvement.

A significant corpus of literature examines the influence of GVCs integration on the exchange rate elasticity of exports. [8] Utilizing panel data from 46 countries between 1996 and 2012, the study reveals that nations more connected to GVCs experience a partial enhancement in the competitiveness of final goods exports subsequent to currency depreciation. They note that, on average, GVCs' participation diminishes the RER elasticity of manufacturing exports by 22 percent. [49] Examine the exchange rate elasticities of exports and imports associated with GVCs and compare them with the elasticities for trade in conventional items. The findings demonstrate that genuine depreciation increases the value-added content of exports related to GVCs. The magnitude of these elasticities is observed to be reduced when the import composition of GVCs exports is greater. [60; 35] assert that the exchange rate pass-through to export pricing is reduced when nations are substantially integrated into GVCs and when exported products increasingly depend on foreign imported inputs.

[18] analyze country-level data from three East Asian nations (China, Japan, and South Korea) and determine that membership in GVCs reduces the exchange rate elasticity of exports. The importance of this influence is contingent upon the degree of GVCs integration and the nation's position within the value chain. [47] Compare the effects of exchange rate levels on international commerce and on the involvement of GVCs, applying their analysis to 72 economies from 2001 to 2015 within the framework of the global financial crisis (GFC). The results reveal a favorable correlation between the RER and export volume prior to the GFC; however, this correlation largely dissipates in the post-GFC period. Additionally, the results suggest that heightened involvement in GVCs reduces the impact of exchange rates on exports and may contribute to weakening the relationship between exchange rates and trade.

[7] Investigate the impact of international integration through GVCs on exchange rate dynamics. The results suggest that greater integration into international value chains decreases the exchange rate elasticity of gross trade sizes. [71], assessed the elasticity of exports in relation to the REER for eight ASEAN nations from 1995 to 2011. The findings indicate that a substantial proportion of FVA incorporated in exports nearly entirely mitigates the negative impact of an appreciation in the REER on real gross exports. [45] Investigates the impact of GVCs' development on diminishing exchange rate pass-through to import and producer prices by analyzing a panel of 43 advanced and emerging economies using a panel smooth transition regression model. The findings suggest that an increase in backward participation in GVCs by suppliers of imported intermediate inputs leads to a decrease in exchange rate pass-through to producer prices in the importing nation. The study by [46] analyzes the impact of GVCs on the relationship between gross exports and the exchange rate. By quantifying the composition of the GVCs utilizing output-related metrics for 61 countries. From 2007 to 2020, using the GMM model. The findings indicate that participation in GVCs disrupts the exchange rate elasticity of exporters. [41] Examine the influence of the REER on Tunisia's GVC trade from 1990 to 2017. Findings indicate that the proportion of FVA in gross exports mitigates the reaction of the REER to exports. A depreciation in the REER based on DVX enhances the value-added exports in Low-Tech manufacturing and service sectors. The analysis indicates that the REER elasticity of foreign value-added in manufacturing sectors has gradually increased over time.

Regarding the conditional impact of the RER in relation to institutional quality and the degree of digitalization. Numerous empirical studies substantiate the beneficial effects of quality institutions and access to telecommunication technology on export performance and participation in GVCs. [28] test the direction of causation between export and Internet penetration in developing and developed countries. The findings indicate that Internet connectivity enhances export performance in underdeveloped nations. Enhancing Internet connection in a developing nation will facilitate exports from that nation to affluent countries. [24; and 53] investigate the factors that cause economies to reap greater benefits from participating in GVCs in Asian countries. The findings indicate that. Initially, advancing to a more upstream role in production and enhancing economic complexity. Secondly, initiatives should focus on reducing trade barriers, enhancing infrastructure, improving human capital development, promoting research and development, and refining institutional frameworks. [58] intend to investigate the determinants affecting involvement in GVCs for 17 landlocked African and non-African nations using OLS methodology. In African nations, researchers identify factors that adversely impact forward linkage (tariffs, institutional quality, access to domestic credit, and level of industrialization) and those that positively influence (quality of overall infrastructure, domestic market size), while all variables negatively affect backward linkage. In non-African nations, forward linkage is adversely correlated with tariffs, institutional quality, and access to domestic credit, while positively correlated with overall infrastructure quality and the degree of industrialization. Backward linking reveals an inverse correlation between institutional quality and domestic market size. Moreover, having access to domestic credit. [36] Investigate how the rollout of the Internet across Chinese regions from 1999 to 2007 influenced the export performance of firms. The findings demonstrate that the Internet expansion enhanced corporate manufacturing exports, prior to the emergence of significant e-commerce platforms. [32] Analyze 149 nations from 1995 to 2015 using the OLS approach. The rise in tariffs on intermediate imports and exports is inversely related to total involvement in GVCs. Forward GVCs are positively correlated with GDP and inversely correlated with industrial value added. Backward GVCs participation correlates favorably with manufacturing value added and the quantity of mobile phone customers, while exhibiting a negative correlation with GDP and trade tariffs. [68] seek to assess the impact of macroeconomic conditions on the participation of GVCs. Utilizing the OLS model with panel fixed effects across 15 Middle East and North Africa (MENA) nations from 2007 to 2018. The empirical findings demonstrate a positive correlation between GDP and FDI, quality of infrastructure, the utilization of mobile devices and the Internet, and regulatory quality. There is a negative correlation with the degree of industrialization, political stability, and control of corruption. [30] indicate that, for Sub-Saharan Africa (SSA) and MENA countries, a rise in telecom subscriptions correlates with a direct elasticity of GVCs participation of 0.4 and an indirect influence of 0.25 via a reduction in trade expenses. [4] Investigate the impact of the undervaluation of the RER on the involvement of 143 countries in GVCs from 1995 to 2018. The results indicate that currency undervaluation exerts a beneficial effect on FVA and DVX. Moreover, undervaluation serves as a compensation mechanism for nations with weak institutions, and its effects become more significant with heightened levels of economic digitalization.

Regarding Egypt's participation in GVCs, the study by [34] aims to assess Egypt's existing involvement in the GVCs, employing a qualitative method. The semi-structured interviews and focus group indicated that Egypt faces several constraints and challenges that impede its involvement in global value chains, including a potential rise in the trade deficit during the initial phases of participation, the lack of a regulatory authority to safeguard exports and markets and to regulate unlicensed exports, insufficient scientific research and development, and the uncoordinated and arbitrary entry of certain manufacturers into promising sectors. Consequently, the paper delineates comprehensive action plans for multiple interrelated sectors, encompassing trade and investment, exports, logistics, international transport, multimodal transport, as well as scientific research, to augment Egypt's engagement in global value chains. [9] Examine the relationship among deep trade agreements, institutional quality, and GVCs in Egypt. Utilizing a Poisson Pseudo-Maximum Likelihood estimator. The study's results corroborate the affirmative correlation between the profundity of trade agreements and GVCs at the aggregate level. Moreover, disparities in institutional quality diminished this beneficial impact. Analyzing the coefficients of trade agreements across various periods reveals that the linkages between GVCs and human capital and technology-intensive items have begun to respond to comprehensive trade agreements, indicating that the depth of these agreements is significantly pertinent to export growth. [5] analyze the influence of political ties on enterprises' engagement in GVCs across six MENA countries, including Egypt, and examine whether political connections assist enterprises in surmounting trade and investment restrictions and enhance their engagement in GVCs at both extensive and intensive margins. The results indicate that political connections have a significant influence on enterprises' engagement in GVCs. The effect is particularly significant for companies that merge political contacts with informal payments to sway policymaking.

From the previous literature, no study directly examines the effect of undervaluation on Egypt's involvement in GVCs. This paper contributes to the current literature in two respects. Initially, in contrast to the majority of studies that examine the effects of RER undervaluation on conventional commerce. Our paper compares the effects of RER undervaluation on international trade and on the involvement in both forward and backward involvement in GVCs. Secondly, we examine how this influence is dependent on supplementary factors, specifically the quality of institutions and the digitization.

4. Stylized facts about Egypt's exchange rate policy regime and trade

4.1 Egypt's exchange rate policy regime and conventional trade

Egypt implemented the Economic Reform and Structural Adjustment Program in the early 1990s, which included currency devaluation. A dual flexible peg exchange rate system briefly replaced the multiple fixed parity exchange system in February 1991[3]. The exchange rate stabilized at approximately US$1 = EGP 3.33, as shown in Figure 1. Effective sterilization stabilized the nominal exchange rate from 1991 to 2000. In January 2003, the government declared the abolition of the exchange rate peg, resulting in a depreciation of the Egyptian Pound's value due to anticipations that the exchange rate would remain significantly distant from market equilibrium. In December 2004, the parallel foreign exchange market was replaced by an interbank market, which stabilized the nominal exchange rate at EGP 5.7/US$1 beginning in December 2005 and maintained this rate until 2010 [76]. During this period, as shown in Figure 2, the trade balance deficit first decreased as exports improved and grew closer to imports. After the currency was pegged again in FY 2004–2005, the deficit again dominated the accounts and balances of payments, including the trade balance [6].

Figure 1: Here

Figure 2: Here

After 2011, Political unrest has led to structural challenges. International reserves declined from US$36 billion in December 2010 to US$15.4 billion in January 2015, paralleling a contraction in exports during the fiscal years 2014, 2015, and 2016, ultimately constituting 10.35% of GDP in 2016, as illustrated in Figure 2. Public debt rose from 70% of GDP in 2009/2010 to 89% in 2014/2015, with interest payments constituting roughly one-third of budgetary expenditures (about 9% of GDP). The current account deficit continued to expand, as reported by the International Monetary Fund (IMF) [43]. In response to urgent concerns, especially regarding fiscal and external sustainability, the Egyptian government commenced negotiations with the IMF in November 2016 for an economic reform program [76]. The IMF Executive Board approved a three-year Extended Fund Facility arrangement of up to SDR 8.597 billion (approximately $12 billion) from November 2016 to November 2019 [43]. At the end of 2016, the Egyptian Pound reached a value of 10.03 per US dollar following the Central Bank of Egypt's discontinuation of the currency peg and the implementation of a market-oriented exchange rate system. At the end of 2024, the exchange rate was EGP 45.3 per US dollar (Figure 1) [74]. The Egyptian Pound's value diminished from $0.65 in 1990 to $0.02 in 2024, representing a fall exceeding 95%, as illustrated in Figure No. 3. Nonetheless, it has proven inadequate to provide a significant enhancement in export performance; the trade balance in goods and services has consistently displayed a deficit, as illustrated in Figure No. 2.

Figure 3: Here

Historical data reveal that Egypt's export performance has struggled to achieve continuous growth, despite the volatility and devaluation trends of its currency, which is likely attributable to elevated trade expenses at the country's cross-border points, ranking 171st out of 190 countries in 2020 (World Bank Doing Business). As shown in Table 1, Trade procedures and documentation result in an extensive and expensive clearance process for imported and exported commodities, especially in comparison to the MENA region. In terms of exports, inefficiency is more evident in procedural duration than in cost. Furthermore, the administrative obstacles to importation are considerably more pronounced than those of comparable nations, both in terms of procedure and expense. This negatively impacts exports due to the significant dependence of domestic production on imported intermediate goods and services. Consequently, although currency devaluation is expected to bolster exports by rendering domestic product prices more competitive, achieving swift and sustained export growth undoubtedly requires more than merely a pricing effect [75].

Table 1: Here

Per Egypt's trade partners during the period from 2005 to 2024, are China (8.6%), the USA (7.2%), Italy (5.7%), Saudi Arabia (5.7%), Germany (4.9%), Turkey (4.3%), India (3.9%), Russia (3.5%), Spain (2.8%), France (2.8%), the United Arab Emirates (2.7%), Brazil (2.6%), and the UK (2.5%) [44]. Egypt's trading partners exhibit diversity, represented by the G7 countries (23.1%), the BRICS countries (18.6%), and Arab countries (8.4%) [44].

As per Import product during the period 2001-2024 are represent in (Mineral fuels 13.1%, Nuclear reactors, boilers, machinery 9.2%, Cereals 7.6%, Electrical machinery and equipment 6.5%, Iron and steel 5.3%, Vehicles other than railway 5.2%, Plastics and articles thereof 4.5%, Articles of iron or steel 3.4%, Pharmaceutical products 3.1%, Wood and articles of wood 2.7%, Animal, vegetable or microbial fats 2.4%, Organic chemicals 2.4%, Oil seeds and oleaginous fruits 2.4%, Meat and edible meat offal 2.3%, Paper and paperboard 1.8%. These products account for 72% of total imports [44].

As per export product during the period 2001-2024 are represent in Mineral fuels31.3%, Electrical machinery and equipment 5.2%, Natural or cultured pearls 4.6%, Plastics and articles thereof 4.5%, Iron and steel 3.8%, Fertilisers 3.6%, Edible fruit and nuts 3.4%, Edible vegetables 3.2%, Cotton 2.9%, Articles of apparel and clothing accessories2.8%, Salt; sulphur; earths and stone 2.5%, Copper and articles thereof 2%, Aluminium and articles thereof 1.9%, Articles of apparel and clothing accessories, knitted or crocheted 1.7% Inorganic chemicals; organic or inorganic compounds of precious metals 1.6%, Articles of iron or steel 1.4%, Glass and glassware 1.3%, Carpets and other textile floor coverings 1.3%. These products account for 79% of the total exports [44].

Based on the previous information, we can evaluate the characteristics of Egypt's imports, which consist of mineral fuels, cereals, pharmaceutical items, and production inputs, including electrical machinery, nuclear reactors, boilers, and iron and steel, which typically exhibit inelastic demand. Exports predominantly comprise fuels, electrical machinery and equipment, textiles, raw materials, fertilizers, and a variety of agricultural products, including vegetables and fruits.

5. Stylized facts about Egypt's GVCs' involvement

Examining GVCs indicators is essential for comprehending Egypt's involvement in GVCs. The GVCs' participation index quantifies forward and backward linkages, assessing the degree of integration within GVCs. Forward participation (DVX) entails domestic manufacturing that is exported to a nation, which subsequently exports the value-added to a third entity. Nonetheless, backward participation (FVA) refers to the share of foreign inputs in the country's exports.

To comprehensively evaluate the influence of undervaluation on the participation of GVCs, it is crucial to analyze a nation's standing within the value chain. Does the nation focus on downstream or upstream activities in the production process? Literature indicates [51; 8; 17; 37] that a country specializes in an upstream activity when its domestic value added in export (DVA) surpasses FVA. Conversely, suppose a nation specializes in advanced manufacturing phases (downstream activities). In that case, it is more inclined to import a greater quantity of intermediate inputs, hence demonstrating a larger degree of FVA in relation to DVX.

Figure 4 illustrates Egypt's percentage participation in GVCs from 1990 to 2018. It is clear from the figure that Egypt's participation is limited, with participation percentages of 0.18% in 2018, 0.14% in DVX, and 0.04% in FVA, indicating that Egypt participates in upstream activities —forward linkages —in GVCs.

Figure (4): Here

Second, Fig. 5 illustrates the share of the DVA and the FVA components in Egypt's exports during the period 1990–2022, which are the two main components that constitute gross exports. The figure shows that the DVA exceeded 85% during the study period. This means that Egypt's exports have a low content of imported intermediates, and they undergo further transformation in destination countries before reaching consumers.

Figure 5: Here

Figure 6 depicts the proportion of value-added components in GVCs for Egypt. We notice an increase in DVX level and a decrease in FVA, as the average share during the period 1990–2022 is equal to 27%. Therefore, Egypt's GVCs participation is concentrated in upstream activities. Egypt's involvement in global value chains is predominantly focused on the lower tiers of diverse product value chains, supplying raw materials and fuel. So the enactment of measures, including intellectual property rights, competition legislation, and labor market rules, would promote the export of products and services characterized by greater complexity and innovation [9].

Figure 6: Here

At the sectoral level, Figures from No. 7 to No. 13 illustrate Egypt's share of the domestic and foreign value-added components of the primary, Services, and manufacturing sectors in GVCs during the period 1990–2022. The manufacturing and services sectors are classified by [38] into High-Tech Manufacturing sectors (HTM), Low-Tech Manufacturing sectors (LTM), High-Tech Service sectors (HTS), and Low-Tech Service sectors (LTS). -The classification of sectors is included in Table 1 in the Appendix. For the primary sector, Fig. 7 illustrates that Egypt participates with an average DVX share of 25% and, FVA share of 13%.

Figure 7: Here

For the manufacturing sector, Egypt is integrated into backward GVCs in manufacturing sectors, as shown in Fig. 8, with 46% on average of FVA, 21% for HTM (as Fig. 9), and 25% (as Fig. 10) for LTM on average, which means Egypt is more integrated in the LTM sector. While forward participation in GVCs represents 35% of DVA (18% for LTM, 17% for HTM). Manufacturing exports depend on imported intermediate inputs.

Figure 8: Here

Figure 9: Here

Figure10: Here

For the services sector, during the period (1990–2016), Egypt is integrated into Forward GVCs, but after 2016, Egypt has shifted from forward to backward participation, as shown in Fig. 11. According to HTS and LTS, we observed that, after 2016, Egypt shifted from a forward to a backward position in the HTS, as shown Fig. 12. However, the FVA share contribution in HTS is very modest, with 15%. In contrast, it is more integrated in the backward direction in LTS, as shown in Fig. 13. This means Egypt is more integrated in the LTS sector.

Figure11: Here

Figure12: Here

Figure13: Here

Overall, Egypt operates more at the beginning of the value chain (forward linkages) in primary sectors, HTM, and HTS, possibly as a provider of raw materials. Thus, Egypt's participation in the forward GVCs depends on intermediate goods and services that will be re-exported by Egypt's partners to a third party.

Per Egypt's partners, Egypt's leading partners in DVX during the period 1990–2022 are, Germany 13.5%, Italy 13.4%, Netherlands 9.2%, United Kingdom (UK) 7.7%, France 7.4%, Belgium 5.7%, Spain 4.2%, U.S. 3.6%, Saudi Arabia 3.3%, Turkey 2.8%, China 2.3%, South Korea 2%, Japan 1.9%, Singapore 1.8%, Greece 1.4%, Sweden 1.1%, India 1%, Canada 1%. which are represent 83% from Egypt's DVX partners.

Per Egypt's FVA partners during the period 1990–2022 are, U.S. 11.6%, China 9.5%, Italy 9.3%, Germany 9%, India 6.3%, UK 5.5%, France 5.2%, Japan 3.1%, Spain 3%, Turkey 3%, Netherlands 2.9%, Belgium 2.3%, Switzerland 1.9%, South Korea 1.7%, Russia 1.5%, Indonesia 1.3%, Sweden 1.2%, Australia 1.1%, Greece 1.1%, Taiwan1.1%, Brazil 1%. These represent 82.6% of Egypt's FVA partners.

From Egypt's partners, DVX and FVA, we observe that Egypt primarily engages in supply chain trade with countries outside its respective region, despite regional trade agreements aimed at reducing trade barriers to intra-regional trade (MENA and SSA)[31].

In conclusion, based on the previous information, Egypt is an upstream country, where DVX is higher than FVA. As per sectors, Egypt is a downstream country in both LTM and LTS (where FVA is greater than DVX). It is an upstream country in the primary and HTM sectors, as well as the HTS sector (where DVX is greater than FVA). To promote Egypt's involvement in GVCs, it necessitates an examination of the effects of devaluation on GVC participation. Where the decline in the RER indicates that imports become more expensive while exporters gain competitiveness. However, in the case of Egypt, its exports are significantly dependent on foreign intermediates, especially within the industrial sector. Therefore, the devaluation of the currency will have a negative impact on integration into GVCs.

6. Methodology

Open-economy macroeconomic models suggest that a depreciation of a nation's currency is expected to decrease demand for imports and increase foreign demand for domestically produced goods, hence enhancing their competitiveness. However, cross-border production connections lead to reduced competitiveness, while exchange rate depreciation boosts the competitiveness of DVX exports, leading to higher imported input costs. The study aims to compare the impact of RER devaluation on Egypt's participation in GVCs and traditional commerce, considering the influences of institutions and digitalization, the two primary controls in GVCs literature analysis. To investigate the correlation between RER devaluation and Egypt's conventional trade and its GVCs involvement, the study employs an ARDL model, which was developed by Pesaran et al. 2001. Using annual data from 1990 to 2022. According to Pesaran, the ARDL models are frequently employed for cointegration analysis for three specific reasons: firstly, since they can be applied irrespective of whether the regressors are I(0), I (1), or mutually cointegrated, provided the variables are not integrated of order I(2), hence obviating the necessity for extensive unit-root testing. Stationarity refers to the principle that the probability distribution remains constant over time. Conducting regression analysis on nonstationary data may yield misleading estimation findings. Secondly, it demonstrates resilience in the face of restricted sample sizes. Thirdly, this method is distinguished by its capacity to generate both short-run and long-run coefficient estimations within a single equation, thereby streamlining the procedure into a single step [13; 22].

The ARDL cointegration methodology will estimate the DVX (refer to forward GVCs participation) and Export models according to Eq. (1), while the FVA (refer to backward GVCs participation) and Import models will be estimated according to Eq. (2).

$$\ln DVX_t^i \, oR \; (Expo) = \beta_0 + \beta_1 GDPc_t + \beta_2 \, RER_t + \beta_3 \, Tariff_{part,t} + \; \beta_4 \, NR_t + \beta_5 \, FD_t + \beta_6 \, NET_t + \beta_7 \, RL_t + \beta_8 \, MVA_t + \; \epsilon_t \ldots\ldots 1$$

$$\ln FVA_t^i \, Or \; (Impo) = \beta_0 + \beta_1 GDPc_t + \beta_2 \, RER_t + \beta_3 \, Tariff_{Egy,t} + \; \beta_4 \, NR_t + \beta_5 \, FD_t + \beta_6 \, NET_t + \beta_7 \, RL_t + \beta_8 \, MVA_t + \; \epsilon_t \ldots\ldots 2$$

The dependent variable, DVX, represents Egypt's forward GVC participation, and FVA represents Egypt's backward participation, both of which are in log form and sourced from the UNCTAD-EORA database. Expo is Egypt's exports of goods and services (% of GDP), Impo is Egypt's imports of goods and services (% of GDP) from World Development Indicators (WDI). β_0 = Constant Term, $GDPc$ is Egypt's real GDP per capita in constant 2015 U.S. dollars, in (Log), which serves as a proxy for the level of development, from the WDI. RER is Egypt's RER index, denoting the actual bilateral exchange rate between the Egyptian pound and the U.S. dollar. Determined by (NER * [PUSA/PEG]), where NER denotes the official exchange rate, PUSA signifies the price level in the U.S., and PEG indicates the price level in Egypt. The consumer price index (CPI) data concurrently functions as a proxy for P from the WDI. The $Tariff_{part}$ represents a weighted average of the tariffs imposed on Egypt and those imposed by its trading partners, expressed as percentages. $Tariff_{Egy}$ is the weighted

average of the tariffs levied by Egypt on its imports (expressed as a percentage). This is included to account for trade openness from the WDI. NR is the overall value of natural resource rents (as a percentage) that reflects the magnitude of a country's endowments. An elevated rent level is typically regarded as a factor that diminishes economic diversification, a phenomenon attributed to the Dutch disease, according to the WDI. FD is the financial institutions' efficiency index, as reported by the IMF, which includes data on the banking sector's net interest margin, lending-deposit spread, non-interest revenue as a proportion of total income, overhead costs relative to total assets, return on assets, and return on equity. NET is the percentage of individuals using the Internet (% population) from the WDI, to gauge the extent of digitalization. In the context of the Fourth Industrial Revolution and task automation, digitalization is a crucial factor influencing GVCs' participation, potentially exacerbating the effects of undervaluation.

Furthermore, the extensive use of the Internet in company operations is expected to augment GVCs' involvement. RL refers to the Rule of Law index from the World Governance Indicators (WGI), which assesses the quality of governance by capturing perceptions regarding the degree of confidence agents have in and adherence to societal rules, specifically concentrating on the efficacy of contract enforcement, property rights, law enforcement, and judicial systems, spanning from around − 2.5 to 2.5. We anticipate that, consistent with the expanding literature on trade and institutions, undervaluation may serve as an effective policy tool in the presence of institutional deficiencies. MVA is the Manufacturing value added (% of GDP) from (WDI), indicating that the level of development and degree of industrialization can alter the economic structure along the development trajectory, with these changes reflected in the levels of GVC involvement. Countries in the early stages of economic growth typically concentrate on primary items that serve as inputs or raw materials for manufacturing processes. Thereby augmenting their prospects for future engagement in the Global Economy [73], ϵ_t= Error Term.

Upon establishing the order of integration of the variables through unit root tests, the subsequent step is to delineate the Bounds test, which involves doing an "F-test,". This assesses the alternative hypothesis of cointegration among variables in contrast to the null hypothesis of no cointegration (H0: w1 + w2 + w3 + w4 + ... = 0). However, the Bounds test is distinct from an "F-test" in that its test statistics do not adhere to a conventional F-distribution, although possessing a structure akin to that of a standard Wald Test ("F-test"). Pesaran et al. (2001) presented two sets of asymptotic critical values: I(0) and I(1), which give three possibilities. First, if the computed Wald or F-statistic surpasses the upper threshold, it signifies a cointegration relationship among the variables, leading to the rejection of the null hypothesis. Second, we cannot reject the null hypothesis, which posits that there is no cointegration between the variables if the calculated F-statistic falls below the lower threshold. Third, we cannot reach a conclusive determination as to whether the calculated F-statistic lies within the specified ranges. Therefore, once the presence of cointegration is confirmed, the long-term coefficients and the corresponding ECM are estimated. In the following, we augmented the models in equations (1) and (2) to capture the ARDL model in (3) and (4), respectively:

$$\Delta \ln \mathrm{DVX}_t^i = \beta_0 + \sum_{i=1}^{n1} \beta_{1,\mathrm{i}} \Delta \ln \mathrm{DVX}_{t-i}^i + \sum_{i=1}^{n2} \beta_{2,\mathrm{i}} \Delta\, lnGDPc_{t-i} + \sum_{i=1}^{n3} \beta_{3,\mathrm{i}} \Delta\, RER_{t-i} + \sum_{i=1}^{n4} \beta_{4,\mathrm{i}} \Delta\, Tariff_{part,\ t-i} + \sum_{i=1}^{n5} \beta_{5,\mathrm{i}} \Delta \quad \text{.....3}$$

$$\Delta \ln \mathrm{FVA}_t^i = \alpha_0 + \sum_{i=1}^{n1} \alpha_{1,\mathrm{i}} \Delta \ln \mathrm{FVA}_{t-i}^i + \sum_{i=1}^{n2} \alpha_{2,\mathrm{i}} \Delta\, lnGDPc_{t-i} + \sum_{i=1}^{n3} \alpha_{3,\mathrm{i}} \Delta\, RER_{t-i} + \sum_{i=1}^{n4} \alpha_{4,\mathrm{i}} \Delta\, Tariff_{Egy,\ t-i} + \sum_{i=1}^{n5} \alpha_{5,\mathrm{i}} \Delta \quad \text{.....4}$$

The coefficients $\beta 10-\beta 18$ in Eq. (3) measure the long-term relationship among the variables from the original DVX equation in (1). In Eq. (4), the term $\alpha 10-\alpha 18$ indicates the sustaining correlation between the variables from the initial FVA equation in (2). The coefficients $\beta 1i-\beta 9i$ and $\alpha 1i-\alpha 9i$ in equations (3) and (4), respectively, specify the direct consequences of the models. $\beta 0$ and $\alpha 0$ denote the distinct elements responsible for drift, whereas the lagged error correction term (ϵ_{t-1}) derived from the error correction model (ECM) is a crucial component in the dynamics of a cointegrated system, facilitating adjustment towards the long-term equilibrium relationship. A significantly negative coefficient on the ECM indicates that a considerable regression towards long-term equilibrium transpires following a positive shock [13, 14, and 22].

7. Empirical Results

Table 2 presents the descriptive statistics for all variables. Associated with the GVCs' participation, the average DVX is 15, and FVA is 14, with a standard deviation of 1.1, indicating stable data. According to conventional trade, the average export is 20, while the average import is 27. We note that there is fluctuation in the data, as indicated by the standard deviation. Dev. Regarding the explanatory factors, the average GDPc is 8, RER is 2.5, NR is 9, NET is 21, and MVA is 16.5. The average RL is relatively low at -0.2. The average tariff imposed by Egypt is 12, while the tariff Egypt faces is 2.7. We note that NET, Egypt's tariff, NR, and RER are the most volatile among other indicators, as they have the highest variation rate.

Table 2: Here

To implement the ARDL model, it is important to do a preliminary test to determine if the variables in equations (1) and (2) are I(0) or I(1). The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were employed to judge the stationarity of the time series, with the findings displayed in Table 3. All variables in the model are integrated of order I(1), and none are integrated of order I(2). Thus, the model estimation may be conducted using the ARDL bound testing methodology.

Table 3: Here

In the second step, we estimate Equations (3) and (4), which will yield both short-term and long-term results. A maximum of four lags is employed for each first-differenced variable, and the Akaike Information Criterion (AIC) is employed to ascertain the best lags. Due to the comprehensive zero-lag findings, the study refrains from revealing the short-run coefficient estimates. Nonetheless, they are available upon request. Table 4 presents the findings for the forward linkages (DVX), while Table 5 delineates the outcomes for the backward linkages (FVA). The F-statistics exceed the upper-bound critical threshold; therefore, the null hypothesis is rejected, indicating a cointegration relationship between the variables. And the ECM coefficients are significantly negative. Consequently, the variables in all equations are cointegrated, and the size of the coefficient indicates the speed of adjustment. The adjusted R2 value

demonstrates a robust fit in the most optimal models, and the residuals in each ideal model are free from serial correlation. Furthermore, all models exhibit stability, conforming to the CUSUM criteria for the letter "S."

Table 4: Here

Table 5: Here

Initially, we observe that the coefficient of RER devaluation is negative and statistically insignificant for both forward and backward links (in both tables 4 and 5, model 1). The outcomes of the backward linkage may seem congruent with conventional trade theory, which posits that undervaluation reduces imports, since their prices in native currency increase. In contrast, the outcomes of the forward linkages contradict traditional trade theory, which posits that undervaluation strengthens competitiveness and boosts exports. Nonetheless, the aforementioned conclusion aligns with the concept that domestic and FVA connected to GVCs are complementary within the supply chain. Consequently, backward GVCs integration results in heightened marginal costs for exporters due to depreciation; an undervaluation causes an escalation in the expense of imported inputs. Hence, diminishing competitiveness and the export volume response compared to the "traditional" route. Hence, decreasing the demand for imported FVA leads to a decrease in production and exporting DVA, particularly for nations that export products dependent on imported intermediate inputs. This outcome is rational, as Egypt has been dependent on imported resources in the manufacturing sector and, more recently, in the services sector since 2016, as shown in Figures 8 and 11.

Notably, after controlling for institutional quality (in both tables 4 and 5, models 2 to 6), there is a persistent increase in the undervaluation coefficient, which attains significance in the backward linkages (FVA). This clearly demonstrates the vital importance of institutions and Internet utilization in amplifying the consequences of undervaluation. Recent research highlights the importance of institutional quality in all aspects of economic performance, particularly in international trade. Multiple literatures, such as those conducted by [10; 20; 66; 48], indicate that enhanced institutional quality positively affects export performance; however, this impact differs across products and may vary between low value-added products (e.g., raw materials), manufactured goods, and high value-added items [56]. Our research (model 2) reveals that the coefficient of financial development is negative and insignificant for forward linkages, whereas it is significant for backward linkages. The diminished access to domestic bank borrowing at favorable interest rates consequently decreases involvement in GVCs within the financial system. In Model 3, regarding technology usage, the results indicate that the coefficient for Internet usage is significant only for the backward linkage, supporting the previously stated significance of Internet connectivity in enhancing involvement in GVCs. The results align with the findings of [40; 4], which suggest that an Internet connection is crucial for enhancing enterprises' integration into GVCs. According to the role of law (model 4), it has a negative impact, but it is not significant on either forward or backward linkage. However, the negative relation may refer to the deficient of institutions, which leads to a problem in agents' confidence in and adherence to societal rules, particularly in the quality of contract enforcement and the protection of property rights. A potential reason we can put forward relates to the type of exported products (manufactured or services, low-value-added or high-value-added) that concentrate on the quality of contract enforcement and property rights. The result is consistent with that of [58; 4]. Ultimately, for MVA (Model 5), the level of industrialization is negative but insignificant. This outcome aligns with the findings of [58; 68].

There exists a positive correlation between income level and the domestic and foreign value-added components; as income level increases, so do these components. Concerning natural resource rents, both DVX and FVA models indicate a positive correlation; nations with scarce rents are more inclined to participate in forward and backward linkages, hence enhancing their economic potential to innovate and undergo structural transformation. In evaluating the effects of tariffs, backward participation is anticipated to be more responsive to the nation's tariff policy, as it involves imports into the country that are subject to the duty. Conversely, forward involvement entails producers encountering levies levied on their exports. A distinction is established between the tariffs imposed on a country's exports (forward linkage) and those levied on its imports (reverse linkage). From the descriptive statistics (Table 2), we observe that Egypt's average tariffs on imports are significantly higher than those placed on its exports by trading partners. The findings demonstrate that tariffs substantially reduce both backward and forward participation in GVCs. Tariffs, especially those levied on intermediate inputs, restrict a nation's access to foreign resources, increase expenses, and ultimately limit the growth and development of downstream sectors. Consequently, trade liberalization serves as a significant factor influencing GVCs' participation, aligning with the conclusions of [4].

According to conventional trade, Table 6 presents the results for the Export. Table 7 reports the results for the Import. The impact of RER depreciation on exports and imports may seem consistent with traditional trade theory, which posits that undervaluation reduces imports, as their prices in the domestic currency increase; furthermore, it increases exports and enhances competitiveness. However, we observe that this relation is not significant in the import model (model 1), which means that Egypt's imports are not elastic in response to RER devaluation. This may be due to the nature of Egypt's imports, which are contingent upon intermediate inputs. Notably, upon incorporating variables for institutional quality (models 2 to 6), we observe an increase in the undervaluation coefficient, which attains significance in the import model (model 3). This effectively illustrates the crucial role of Internet usage in enhancing the effects of undervaluation. According to recent literature, devaluation serves as a compensation mechanism for nations with weak institutions, and its effects become more pronounced with increased levels of economic digitalization [4].

Table (6): Here

Table (7): Here

7.1 Robustness Checks

To verify the robustness of our results, the regressions for different sectors in GVCs run separately. The Primary sector (in Tables 8 and 9), the Manufacturing sector (divided into High-Tech as shown in Tables 10 and 11, and Low-Tech sectors, as shown in Tables 12 and 13. And the services sector with HTS as shown in Tables 14 and 15. At the same time, LTS were not analyzed because they contain both tradable and non-tradable services. Devaluation can yield varying outcomes contingent upon the sector type. Nonetheless, across all sector types, we see that devaluation has a markedly adverse effect on both forward and backward linkages. These outcomes confirm the notion of complementarity between GVCs-related FVA and DVA in production, as both DVA and

FVA regularly display similar signs. This indicates that a reduction (or increase) in the production and export of DVA results in a decline (or rise) in the demand for imported FVA.

Table (8): here

Table (9): here

Table (10): here

Table (11): here

Table (12): here

Table (13): here

Table (14); here

Table (15): here

In summary, undervaluation has a statistically significant adverse effect on both forward and backward linkages. The results corroborate the baseline regressions (Table No. 4, 5), affirming the robustness and longevity of the outcomes. Consequently, Egypt lacks the capacity to integrate into GVCs.

8. Conclusions and recommendations

In the era of significant industrial process fragmentation, Global Value Chains (GVCs) have emerged as the primary framework in global trade dynamics. They facilitate the specialization of enterprises in developing nations in particular tasks, hence providing enhanced access to global markets. Participation in GVCs can enhance the composition of exports rather than merely augmenting their volume. Given that Egypt has long been restricted to exporting traditional goods, integration into global value chains is likely to enhance productivity and enable the export of new and comparatively non-traditional goods. So, it is essential to identify how trade in value-added and intermediate inputs reacts to exchange rate undervaluation.

The study examines the effects of Egypt's currency devaluation on its involvement in global value chains (GVCs) and conventional trade, utilizing the ARDL model from 1990 to 2022, while considering various potentially related factors, including income level, industrialization, institutional quality, financial development, and the degree of digitalization. The analysis reveals that Egypt faces two primary issues with Global Value Chains (GVCs): inadequate participation in GVCs overall and, specifically, in high-value-added chains. Furthermore, bureaucratic impediments in Egypt constitute a significant barrier to trade, affecting a substantial number of exporting firms. Moreover, these considerations are not limited to export operations; they also relate to imports, as the local industry's substantial reliance on imported intermediate inputs affects exporting businesses. The empirical results indicate that RER impacts on GVC-related backward participation (FVA) align with traditional trade concerning imports of final goods. Depreciation results in higher import prices, which then diminishes domestic demand for such goods. However, regarding the impact of devaluation on GVCs' forward involvement, the effects differ from those on traditional trade. While devaluation enhances the competitiveness of final products exports, it adversely affects value-added exports (forward participation, DVX) associated with global value chains (GVCs). As local and foreign value-added in global value chains are complementary in manufacturing, an increase in the cost of imported intermediate inputs leads to a decline in output and exports. Consequently, fluctuations in the Real Exchange Rate in industries with a greater proportion of foreign value-added will not enhance local value-added exports. Export-oriented and import-dependent enterprises will incur substantial costs when participating in global value chains. Those enterprises will not gain from a declining real exchange rate.

From a policy standpoint, undervaluation cannot rectify the economic burden of deficient institutions and market failures, as it adversely affects value-added exports. Consequently, an effective strategy to improve Egypt's integration into Global Value Chains (GVCs) and maximize benefits from recent disruptions, including the Ukraine conflict, COVID-19 pandemic, and the US-China trade war—factors that significantly influence the restructuring of GVCs across various industries—requires the country to promote participation of firms in diverse sectors within GVCs. Prepare the business environment to encourage enterprises impacted by these shocks to produce in Egyptian factories utilizing local components. Therefore, this strategy should entail identifying market issues and executing customized solutions. The currency rate strategy must be aligned with supplementary policies, which require extensive reforms to strengthen institutions, achieve advanced digital transformation, and cultivate a manufacturing sector capable of exporting. This can be accomplished via:

1. Efforts must be undertaken to stabilize the pound's exchange rate versus the dollar.
2. Develop strategies and policies to foster innovation and localize technology to engage in sectors marked by enhanced value addition and sophisticated technology.
3. Implementing a vertical development policy, termed "Vertical Integration," to guide local investments and institutions in substituting imported intermediate materials in final export goods with domestically produced alternatives, while offering these enterprises incentives as a form of export encouragement.
4. Utilizing preferential trade agreements between Egypt and other nations is crucial for expanding global market access. This suggests trade talks should aim for more comprehensive accords that cover non-tariff measures, standard harmonization, and service and investment requirements. In contrast, maximizing commercial representation to boost investment prospects. This would help Egypt expand regional and global value chains, benefiting exporters.
5. Promptly addressing investors' issues, primarily by preventing their recurrence, and ensuring the execution of decisions made by dispute resolution committees.

6. Improving institutional quality and reducing administrative burdens to boost FDI. As modern technologies and experience from FDI increase Egyptian enterprises' productivity and competitiveness.
7. Further advancements are required to mitigate skill mismatches (e.g., reforming educational systems to align with labor market demands) and to bolster entrepreneurship in high-value-added sectors and activities.
8. Investing in a robust infrastructure, encompassing ports, roads, and communications, will save costs and time related to commerce.
9. Promote sectoral industrial zone development. Establish clusters by building small youth workshops near major firms, combining them into integrated industrial complexes (Clustering), and offering technical support and global product promotion. To help small and microenterprises finance these projects, more credit facilities are needed.
10. Offering tax incentives to local firms supplying production inputs to exporting industries.
11. Enhancing Egyptian exports to the African market, through regional conferences, project promotion, and assisting international investors in finding partners.

Abbreviations

Autoregressive Distributed Lag	ARDL
Domestic Value-Added exports	DVA
Error Correction Model	ECM
European Union	EU
Exchange Rate Volatility	ERV
Financial Institutions' Efficiency Index	FD
Foreign Value Added - backward participation-	FVA
GDP per capita	GDPc
Generalized Method of Moments	GMM
Global Financial Crisis	GFC
Global Value Chains	GVCs
Gross Domestic Product	GDP
High-Tech Manufacturing	HTM
High-Tech Service	HTS
International Monetary Fund	IMF
Involvement in GVCs through Domestic Value Added - Forward participation-	DVX
Low-Tech Manufacturing	LTM
Low-Tech Service	LTS
Manufacturing Value Added	MVA
Marshall–Lerner	M-L
Middle East and North Africa	MENA
Natural Resource Rents	NR
Ordinary Least Squares	OLS
Percentage of Individuals Using the Internet	NET
Pooled Mean Group	PMG
Real Effective Exchange Rate	REER
Real Exchange Rate	RER
Rule of Law Index	RL
Sub-Saharan Africa	SSA
United Kingdom	UK
United States Dollar	U.S.$
World Development Indicators	WDI

Declarations

a. Ethical approval and consent to participate

Not applicable.

b. Consent for publication

Not applicable.

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Author Contribution

Only one Author H.A.S.1- constructing and developing the introduction, conceptual framework, reviews the related previous studies, and gathering data from the different website.2- Analysis and interpreted the data regarding the evaluate the impact of real exchange rate devaluation on global value chains and conventional trade on Egypt. By adopting ARDL model, as well as developing the conclusion section.

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Data Availability

The datasets used and/or analyzed during the current study are available from thecorresponding author on reasonable request.

References

1. Abbas, S., Nguyen, V. C., Yanfu, Z., & Nguyen, H. T. (2020). The impact of China exchange rate policy on its trading partners evidence based on the GVAR model. Journal of Asian Finance, Economics and Business, 7(8), 131-141. https://doi.org/10.13106/jafeb.2020.vol7.no8.131.
2. Abdel-Kader E. (2013) Is the J curve effect observable for Egypt economy, Journal of Economic Cooperation and Development, 34(1), 91-118.
3. Abdel-Khalek G. (1995) Economic Reform or Dutch Disease? On the Macroeconomic Effects of ERSAP. Economic Papers No. 7. Center for Economic and Financial Research and Studies, Cairo University.

4. Abdou, M., Elbadawi, I., Plane, P., and and Zaki C., 2024, Unraveling the nexus between exchange rate undervaluation and global value chain participation, The Economic Research Forum (ERF) , Working Paper No. 1709.
5. Aboushady, Nora; Zaki, Chahir (2023) : Are global value chains for sale? On business-state relations in the MENA region, IDOS Discussion Paper, No. 17/2023, ISBN 978-3-96021-220-1, German Institute of Development and Sustainability (IDOS), Bonn, https://doi.org/10.23661/idp17.2023
6. Adams, J., & Metwally, A. (2020). Testing for the Marshall–Lerner condition in Egypt: an empirical analysis. African Journal of Economic and Management Studies, 12(1), 151–170. https://doi.org/10.1108/ajems-01-2020-0001.
7. Adler G, Meleshchuk S. and Buitron C., 2019, Global Value Chains and External Adjustment: Do Exchange Rates Still Matter?, International Monetary Fund WP/19/300
8. Ahmed, S., Appendino, M., and Ruta, M. (2016). Global Value Chains and the Exchange Rate Elasticity of Exports. The BE Journal of Macroeconomics, 17(1), 20150130.
9. Aly, F. and Zaki, C. (2024) 'On deep trade agreements, institutions, and global value chains: evidence from Egypt,' Review of World Economics [Preprint]. https://doi.org/10.1007/s10290-024-00546-4.
10. Anderson, J. E. and Marcouiller, D. (2002). Insecurity and the Pattern of Trade: An Empirical Investigation. Review of Economics and Statistics, 84(2), 342-352.
11. Andohol, J. T., Ijirshar, V. U., Ogunjemilua, O. D., Gbaka, S. (2024). Exchange Rate Changes and Trade Flows in East Asia. Scientific Annals of Economics and Business, 71(1), 129-153. https://doi.org/10.47743/saeb- 2024-0007.
12. Ayele, G. M. (2019). Does real exchange rate devaluation improve the current account balance of highly indebted low income countries? African Journal of Economic and Management Studies, 10(2), 212–225. https://doi.org/10.1108/ajems-11-2017-0287
13. Badr O. and El-khadrawi A., 2018, Exchange Rate Volatility and Trade: An Empirical Investigation from the Egyptian Economy , Applied Economics and Finance Vol. 5, No. 4; July, 2018, doi:10.11114/aef.v5i4.3318.
14. Bahmani-Oskooee M, Hosny AS (2012) Long-run price elasticities and the marshall-lerner condition: evidence from Egypt–EU commodity trade. Eur J Dev Res 25(5):695–713. https:// doi. org/ 10. 1057/ ejdr. 2012. 42
15. Bahmani-Oskooee, M., and Hosny, A. (2014) Price and income elasticities: evidence from commodity trade between the US and Egypt, International Economics and Economic Policy, 11(4), 561-574.
16. Bahmani-oskooee, M., Hegerty S., and Hosny A. (2015) Exchange-Rate Volatility and Commodity Trade Between The E.U. and Egypt: Evidence from 59 Industries, Empirica 42(1), 109-129.
17. Banerjee, B. and Zeman, J. (2022). Determinants of Global Value Chain Participation: Cross- Country Analysis. Indian Economic Review, 57(1), 59-95.
18. Bang, H. and Park, M. (2018). Global Value Chain and its Impact on the Linkage between Exchange Rate and Export: Cases of China, Japan and Korea. The World Economy, 41(9), 2552-2576.
19. Bems, R. and Johnson, R. C. (2017). Demand for Value Added and Value-Added Exchange Rates. American Economic Journal: Macroeconomics, 9(4), 45-90.
20. Borrmann, A., Busse, M., and Neuhaus, S. (2006). Institutional Quality and the Gains from Trade. Kyklos, 59(3), 345-368.
21. Brach, J. and Naudé, W. (2012). International Entrepreneurship and Technological Capabilities in the Middle East and North Africa. Maastricht: UNU-MERIT, Maastricht Economic and Social Research and Training Centre on Innovation and Technology.
22. Breitenbach MC, Amaral AJC (2021) The marshall-lerner condition in the fragile five economies: evidence from the ARDL bounds test approach. Busines Econ Res J 12(4):731–750. https:// doi. org/ 10. 20409/ berj. 2021. 349
23. Brixiova, Z., Egert, B. and Essid, T.H.A. (2014) 'The real exchange rate and external competitiveness in Egypt, Morocco and Tunisia,' Review of Middle East Economics and Finance, 10(1). https://doi.org/10.1515/rmeef-2013-0014.
24. Cheng K., Rehman S., Seneviratne D., and Zhang S., 2015, Reaping the Benefits from Global Value Chains, IMF Working Paper, WP/15/204.
25. Cheng, K. (2020) Currency devaluation and trade balance: evidence from the US services trade. Journal of Policy Modeling, 42(1), 20-37.
26. Cheng, K. C., Hong, G. H., Seneviratne, D., and van Elkan, R. (2016). Rethinking the Exchange Rate Impact on Trade in a World with Global Value Chains. International Economic Journal, 30(2), 204-216.
27. Clarke, G. R. (2008). Has the Internet Increased Exports for Firms from Low and Middle- Income Countries? Information Economics and Policy, 20(1), 16-37.
28. Clarke, G. R. and Wallsten, S. J. (2006). Has the Internet Increased Trade? Developed and Developing Country Evidence. Economic Inquiry, 44(3), 465-484.
29. Cusolito, A. P., Lederman, D., and Peña, J. (2020). The Effects of Digital-Technology Adoption on Productivity and Factor Demand: Firm-Level Evidence from Developing Countries. World Bank Group, Middle East and North Africa Region, Office of the Chief Economist.
30. De Melo, J. and Solleder, J. M. (2022). Structural Transformation in MENA and SSA: The Role of Digitalization. Economic Research Forum (ERF).
31. De Melo, J. and Solleder, J. M. (2022a). Patterns and Correlates of Supply Chain Trade in MENA and SSA (No. P304). FERDI Working Paper.
32. De Melo. J and Twum A., 2020, Supply Chain trade in East Africa:Prospects and Challenges, international growth center, F-19103.
33. Elbadawi, I. and Zaki, C. (2021). Exchange Rate Undervaluation, Economic Institutions and Exports Performance: Evidence from Firm-Level Data. International Journal of Trade and Global Markets, 14(1), 62-93.
34. Elwakkad and Deselnicu, 2021, Egypt's Participation in the Global Value Chain: A Proposed Road Map, International Business Logistics Journal (IBL) Volume 1, Issue 2, December 2021, http://dx.doi.org/10.21622/IBL.2021.01.2.039.

35. Fauceglia, D., Lassmann, A., Shingal, A., and Wermelinger, M. (2018). Backward Participation in Global Value Chains and Exchange Rate Driven Adjustments of Swiss Exports. Review of World Economics, 154, 537-584.
36. Fernandes, A. M., Mattoo, A., Nguyen, H., and Schiffbauer, M. (2019). The Internet and Chinese Exports in the Pre-Ali Baba Era. Journal of Development Economics, 138, 57- 76.
37. Fišera, B. and Horváth, R. (2022). Are Exchange Rates Less Important for Trade in a More Globalized World? Evidence for the New EU Members. Economic Systems, 46(1), 100868.
38. Foster-McGregor N., Kaulich F., and Stehrer R., 2015, Global Value Chains in Africa, UNU-MERIT, Working paper 2015-024.
39. Frieden, J. A. (1991). Invested Interests: The Politics of National Economic Policies in a World of Global Finance. International Organization, 45(4), 425-451.
40. Gopalan, S., Reddy, K., and Sasidharan, S. (2022). Does Digitalization Spur Global Value Chain Participation? Firm-Level Evidence from Emerging Markets. Information Economics and Policy, 59, 100972.
41. Guedidi I and Baghdadi L., 2023, Global Value Chain Participation and Real Effective Exchange Rates: Insights from Tunisia, World bank working paper, https://thedocs.worldbank.org/en/doc/d0db5de683851eb105f64fb47cace211-0280032023/original/Global-Value-Chain-Participation-and-Real-Effective-Exchange-Rates-Insights-from-Tunisia.pdf.
42. Hagsten, E. and Kotnik, P. (2017). ICT as Facilitator of Internationalisation in Small- and Medium-Sized Firms. Small Business Economics, 48, 431-446.
43. IMF.(2016) Press Release No.16/501. Washington, D.C. 20431 USA: International Monetary Fund.
44. International Trade Center (2025) ITC, https://www.trademap.org/Country_SelProductCountry_.
45. Jan H & Aleksandra H. & Jacek K., 2022. "Global value chains and exchange rate pass-through—The role of non-linearities," International Review of Economics & Finance, Elsevier, vol. 82(C), pages 461-478.
46. Jangam, B.P. and Venkatesh, H. (2022) 'Global value chains and exchange rate disconnect*,' Economic Papers a Journal of Applied Economics and Policy, 41(4), pp. 347–359. https://doi.org/10.1111/1759-3441.12370.
47. Kang J & Dagli S (2018) International trade and exchange rates, Journal of Applied Economics, 21:1, 84-105, DOI: 10.1080/15140326.2018.1526878.
48. Karam, F. and Zaki, C. (2019). Why Can't MENA Countries Trade More? The Curse of Bad Institutions. Quarterly Review of Economics and Finance, Vol. 73, pp.56-77.
49. Kevin C. Cheng & Gee Hee Hong & Dulani Seneviratne & Rachel van Elkan, 2016. "Rethinking the Exchange Rate Impact on Trade in a World with Global Value Chains," International Economic Journal, Taylor & Francis Journals, vol. 30(2), pages 204-216, June.
50. Kim, D. (2020). Internet and SMEs' Internationalization: The Role of Platform and Website. Journal of International Management, 26(1), 100690.
51. Koopman, R., Powers, W., Wang, Z., and Wei, S. J. (2010). Give Credit Where Credit is Due: Tracing Value Added in Global Production Chains (No. w16426). National Bureau of Economic Research.
52. Leigh, D. et al. (2017) 'Exchange rates and trade: a disconnect?,' IMF Working Paper, 17(58), p. 1. https://doi.org/10.5089/9781475587494.001.
53. Lopez-Gonzalez, J. (2016-10-11), "Using Foreign Factors to Enhance Domestic Export Performance: A Focus on Southeast Asia", OECD Trade Policy Papers, No. 191, OECD Publishing, Paris. http://dx.doi.org/10.1787/5jlpq82v1jxw-en.
54. Loto M.A., 2011. Does devaluation improve the trade balance of Nigeria? (A test of the Marshall-Lerner condition), J. Econ. Int. Finan. 3, 624–633.
55. Mamun, A., Akça, E. E., and Bal, H. (2021). The Impact of Currency Misalignment on Trade Balance of Emerging Market Economies. Organizations and Markets in Emerging Economies, 12(2), 285-304.
56. Méon, P. G. and Sekkat, K. (2008). Institutional Quality and Trade: Which Institutions? Which Trade? Economic Inquiry, 46(2), 227-240.
57. Mostafa, R. H., Wheeler, C., and Jones, M. V. (2005). Entrepreneurial Orientation, Commitment to the Internet and Export Performance in Small and Medium Sized Exporting Firms. Journal of International Entrepreneurship, 3, 291-302.
58. Mounada G and Gong J., 2019.,Determinants of global value chains for landlocked countries, International Journal of Social Sciences and Economic Research ISSN: 2455-8834, 4(5).
59. Ng, Y., Har, W., & Tan, G. (2009). Real Exchange Rate and Trade Balance Relationship: An Empirical Study on Malaysia. International Journal of Business and Management, 3(8). https://doi.org/10.5539/ijbm.v3n8p130.
60. Ollivaud, P., Rusticelli, E., and Schwellnus, C. (2015). The Changing Role of the Exchange Rate for Macroeconomic Adjustment. OECD Economics Department Working Papers, No. 1190.
61. Oumansour, N. E., & Azghour, Z. (2024). Exchange rate misalignment and trade fluctuations in Morocco: Empirical evidence. The Japanese Political Economy, 50(1), 66–90. https://doi.org/10.1080/2329194X.2024.2321436
62. Rasbin, M., Ikhsan, M., Y. Gitaharies, B., and Affandi, Y. (2021). Real Exchange Rate Undervaluation and Indonesia's Manufacturing Exports. Cogent Economics and Finance, 9(1), 1930880.
63. Rikhotso, P., & Bonga-Bonga, L. (2021). Exchange rate misalignments and current accounts in BRICS countries. MPRA Working Paper No. 170973.
64. Rodrik, D. (1986). 'Disequilibrium' Exchange Rates As Industrialization Policy. Journal of Development Economics, 23(1), 89-106.
65. Rowbotham, N., Saville, A., and Mbululu, D. (2014). Exchange Rate Policy and Export Performance in Efficiency-Driven Economies. Available at SSRN 2443280.
66. Soeng, R. and Cuyvers, L. (2018). Domestic Institutions and Export Performance: Evidence for Cambodia. J Int Trade Econ Dev 27:389–408.
67. Soliman, H.A. (2024) 'Empirical tests of the Marshall–Lerner condition: evidence from Egypt–BRICS commodity trade using ARDL approach,' Future Business Journal, 10(1). https://doi.org/10.1186/s43093-024-00408-3.

68. Soliman, H.A. and Elbolok, R.M. (2021) 'Determinants of MENA Countries participation in Global Value Chains,' Scientific Journal for Economic& Commerce, 51(3), pp. 271–304. https://doi.org/10.21608/jsec.2021.163356.
69. Steinberg, D. A. (2016). Developmental States and Undervalued Exchange Rates in the Developing World. Review of International Political Economy, 23(3), 418-449.
70. Svensson, J. (2003). Who Must Pay Bribes and How Much? Evidence from a Cross Section of Firms. The Quarterly Journal of Economics, 118(1), 207-230.
71. Tan K & Duong L & Chuah H, 2019. "Impact of exchange rates on ASEAN's trade in the era of global value chains: An empirical assessment," The Journal of International Trade & Economic Development, Taylor & Francis Journals, vol. 28(7), pages 873-901, October.
72. Williamson, J. (1997). Exchange Rate Policy and Development Strategy. Journal of African Economies, 17-36.
73. World Bank, 2020, Trading for Development in the age of global value chains, world develomenet report, The Development in the age of global value chains, world development report, The World Bank, Washington.
74. World Bank, 2025, World Development Indicator (WDI) online database of the World Bank, https://data.worldbank.org/indicator/PA.NUS.FCRF.
75. Youssef, H., & Zaki, C. (2019). From Currency Depreciation to Trade Reform: How to Take Egyptian Exports to New Levels? World Bank, policy research W.P.8809, Washington, DC https://doi.org/10.1596/1813-9450-8809.
76. Zaki, C.; Abdallah, A.; and Sami, M.(2019) How Do Trade Margins Respond to Exchange Rate? The Case of Egypt, Journal of African Trade, 6(1), 60-80.

Tables

Table 1. Trading Across Borders, Doing Business Indicators 2018

Indicator	Egypt	MENA	OECD
Time to export			
Documentary compliance (hours)	88	66.4	2.3
Border compliance (hours)	48	52.5	12.7
Cost to export			
Documentary compliance (US$)	100	240.7	33.4
Border compliance (US$)	258	441.8	136.8
Time to import			
Documentary compliance (hours)	265	72.5	3.4
Border compliance (hours)	240	94.2	8.5
Cost to import			
Documentary compliance (US$)	1000	262.6	23.5
Border compliance (US$)	554	512.5	98.1

Source: World Bank Doing Business Indicators (2020).

Table 2: Descriptive Statistics

	LDVX	LFVA	EXPO	IMPO	LGDPC	RER	NR	NET	MVA	RL			FD
Mean	15.0	14.0	20.3	26.7	7.9	2.5	9.0	20.7	16.5	-0.2	12.1	2.7	0.3
Maximum	16.6	15.6	33.0	38.6	8.3	14.1	17.9	72.2	18.5	0.0	19.9	6.3	0.4
Minimum	13.1	12.3	10.3	19.3	7.6	-0.2	3.2	0.0	15.4	-0.7	6.6	1.3	0.2
Std. Dev.	1.1	1.1	6.2	4.9	0.2	2.9	3.7	23.3	0.8	0.2	4.2	1.2	0.1
Observations	33	33	33	33	33	33	33	33	33	33	33	33	33

Source: computation by the author based on e-views-12.

Table 3: Unit Root test

Variables	PP		ADF	
	level	first difference	level	first difference
LDVX	-1.2035	-4.7186***	-1.0818	-6.0617***
LFVA	-0.8812	-3.7381***	-0.8808	-4.8825***
Expo	-1.6520	-4.4617***	-2.2248	-4.4617***
Impo	-2.0670	-4.5327***	-2.8702	-4.593***
LGDPc	0.3343	-3.2733**	-0.3816	-3.2945**
RER	-1.0955	-6.6412***	-1.2080	-6.7847***
NR	-2.6428	-5.5081***	-2.6426	-5.5081***
	-1.8828	-5.0414***	-1.401	-5.0636***
	-1.6532	-14.8925***	-1.4944	-7.4695***
FD	-1.6115	-5.3394***	-1.6075	-5.3384***
RL	-1.5048	-4.1240***	-1.3787	-4.2547***
NET	4.7722	-3.7237***	3.5852	-3.7009***
MVA	-2.2230	-5.6261***	-1.9089	-5.6328***

Source: computation by the author based on e-views-12, ***, and **significant at the 1%, and 5 % levels, respectively.

Table 4: DVX equation- long-run results-

variables	DVX models					
	(1,0,0,0,0)	(1,0,0,0,1,0)	(1,0,0,0,1,0)	(1,0,0,0,1,0)	(1,0,1,1,0,0)	(1,1,0,0,0,0,0,0,0)
	1	2	3	4	5	6
c	-32.603***	-33.519***	-30.596***	-33.775***	-35.261***	-46.127***
	(-7.275)	(-6.947)	(-3.709)	(-5.158)	(-4.320)	(-2.915)
RER	-0.011	-0.022	-0.031	-0.024	-0.012	-0.029
	(-0.612)	(-1.133)	(-1.215)	(-0.918)	(-0.624)	(-0.933)
GDPC	5.898***	6.068***	5.640***	6.044***	6.170***	7.485***
	(11.198)	(10.573)	(5.557)	(7.619)	(7.380)	(3.978)
Tariff	-0.206**	-0.201	-0.222*	-0.246	-0.257	0.229
	(2.158)	(1.192)	(1.807)	(1.034)	(1.151)	(1.663)
NR	0.051**	0.055**	0.050**	0.050**	0.056*	0.088*
	(2.573)	(2.550)	(2.248)	(2.161)	(1.940)	(1.824)
FD		-1.334				-2.947
		(-1.278)				(-1.244)
NET			0.004			-0.004
			(0.510)			(-0.420)
RL				-0.022		0.581
				(-0.054)		(0.844)
MVA					0.018	0.102
					(0.205)	(0.749)
Cointegration results						
F	7.625***	6.938***	6.394***	6.291***	3.526**	4.616***
ECMt−1	-0.571***	-0.521***	-0.491***	-0.488***	-0.561***	-0.513***
	(-7.386)	(-7.791)	(-7.480)	(-7.419)	(-5.579)	(-8.120)
Adj.R2	0.524	0.592	0.569	0.565	0.503	0.581
Diagnostic tests						
LM test	1.236	1.988	2.183	2.157	2.054	1.257
	(0.3082)	(0.1267)	(0.0875)	(0.0926)	(0.1531)	(0.3072)
Arch	0.586	1.719	2.189	1.505	0.836	1.734
	(0.4502)	(0.1887)	(0.1315)	(0.2401)	(0.3680)	(0.1982)
CUSUM	S	S	S	S	S	S

Source: computation by the author based on e-views-12, ***, and **significant at the 1%, and 5 % levels, respectively.

Table 5: FVA equation- long-run results-

variables	FVA models					
	(1,0,0,0,1)	(1,0,0,0,1,3)	(1,0,0,0,1,0)	(1,4,0,0,0,4)	(1,1,0,0,1,1)	(1,0,0,0,1,0,0,0,1)
	1	2	3	4	5	6
c	-15.734	-29.848**	-5.798	-1.151	-13.859*	-9.937
	(-1.221)	(-2.611)	(-0.907)	(-0.159)	(-1.701)	(-1.212)
RER	-0.074	-0.088	-0.073**	-0.080	-0.089*	-0.090**
	(-0.939)	(-1.226)	(-2.346)	(-1.303)	(-1.719)	(-2.428)
GDPC	3.867**	5.808***	2.483***	1.989**	4.247***	3.263***
	(2.580)	(4.066)	(3.180)	(2.222)	(4.769)	(3.119)
Tariff	-0.045	-0.040	-0.024	-0.105**	-0.003	-0.004
	(-0.631)	(-0.707)	(-0.865)	(-2.450)	(-0.077)	(-0.108)
NR	0.033	0.098	0.037*	0.081**	-0.039	0.008
	(0.680)	(1.661)	(1.908)	(2.480)	(-1.088)	(0.270)
FD		-6.993*				0.054
		(-2.611)				(0.029)
NET			0.021**			0.015*
			(3.251)			(1.836)
RL				-1.117		-0.006
				(-1.345)		(-0.011)
MVA					-0.296	-0.113
					(-1.183)	(-0.940)
Cointegration results						
F	5.329***	5.181***	7.508***	10.099***	6.627***	5.289***
ECMt−1	-0.207***	-0.263***	-0.451***	-0.537***	-0.317***	-0.454***
	(-6.194)	(-6.908)	(-8.105)	(-10.050)	(-7.684)	(-8.757)
Adj.R2	0.511	0.668	0.651	0.745	0.667	0.715
Diagnostic tests						
LM test	0.954	0.239	0.020	2.744	0.454	0.003
	(0.4000)	(0.6305)	(0.8877)	(0.1215)	(0.5078)	(0.9590)
ARCH	0.016	0.080	0.564	0.009	0.023	1.335
	(0.9000)	(0.7790)	(0.4587)	(0.9242)	(0.8808)	(0.2573)
CUSUM	S	S	S	S	S	S

Source: computation by the author based on e-views-12, ***, and **significant at the 1%, and 5 % levels, respectively.

Table 6: Export equation- long-run results-

variables	Export models					
	(3,3,2,0,0)	(1,1,0,0,0,0)	(1,3,2,1,3,2)	(1,2,3,3,0,2)	(1,0,0,0,0,0)	(1,0,0,0,0,0,0,0,0)
	1	2	3	4	5	6
c	-9.760	24.211	370.085***	-89.192	-8.793	130.912**
	(-0.315)	(0.542)	(3.176)	(-1.673)	(-0.093)	(2.572)
RER	0.972**	0.293	0.963*	0.242	0.178	-0.538***
	(2.659)	(1.157)	(1.986)	(0.738)	(0.599)	(-4.548)
GDPC	1.385	-3.643	-45.985	11.708*	-0.237	12.816*
	(0.377)	(-0.686)	(-0.790)	(1.854)	(-0.026)	(-2.058)
Tariff	1.429	1.441	-1.515	1.429	1.123	-0.163
	(1.117)	(1.475)	(-1.172)	(1.147)	(0.716)	(-0.307)
NR	1.367***	1.514***	1.038***	1.663***	1.869***	1.089***
	(-0.315)	(7.722)	(4.227)	(10.109)	(5.029)	(6.017)
FD		25.018**				30.032***
		(2.325)				(3.458)
NET			0.447**			0.087*
			(3.057)			(1.930)
RL				9.730**		8.372***
				(2.702)		(-2.338)
MVA					0.674	-1.553**
					(0.485)	(-2.572)
Cointegration results						
F	13.456***	9.269***	5.198***	23.655***	5.805***	14.436***
ECMt−1	-0.845***	-0.706***	-0.639***	-0.828***	-0.590***	-1.079***
	(-10.221)	(-9.006)	(-7.388)	(-15.557)	(-7.098)	(-14.262)
Adj.R2	0.827	0.725	0.889	0.912	0.618	0.867
Diagnostic tests						
LM test	0.665	1.842	2.868	2.645	1.806	2.080
	(0.5289)	(0.1705)	(0.1127)	(0.1154)	(0.1755)	(0.1258)
ARCH	0.498	0.210	2.190	0.163	0.159	0.864
	(0.4863)	(0.6502)	(0.1329)	(0.6899)	(0.6927)	(0.3602)
CUSUM	S	S	S	S	S	S

Source: computation by the author based on e-views-12, ***, and **significant at the 1%, and 5 % levels, respectively.

Table 7: Import equation- long-run results-

variables	Import models					
	(2,0,1,0,0)	(1,0,1,0,0,1)	(1,0,2,2,0,1)	(1,0,0,0,0,0)	(1,0,1,0,0,0)	(1,0,0,0,0,0,0,0,0)
	1	2	3	4	5	6
c	69.276	86.524	21.515	65.192	90.947	142.798*
	(1.303)	(1.000)	(0.302)	(1.028)	(1.383)	(1.922)
RER	-0.158	-0.081	-1.171***	-0.213	-0.158	-0.563**
	(-0.657)	(-0.224)	(-3.067)	(-0.733)	(-0.477)	(-2.382)
GDPC	-6.229	-8.519	-2.249	-4.472	-7.391	-12.707
	(-0.998)	(-0.819)	(-0.265)	(-0.596)	(-0.908)	(-1.252)
Tariff	-0.280	-0.342	0.672	-0.668*	-0.218	-0.192
	(-0.932)	(-0.759)	(1.538)	(-1.803)	(-0.520)	(-0.561)
NR	0.879***	1.058***	1.168***	0.867***	0.958***	0.687***
	(4.884)	(3.364)	(6.957)	(4.067)	(4.078)	(2.917)
FD		2.770				22.610
		(0.158)				(1.425)
NET			0.220***			0.094
			(2.979)			(1.267)
RL				11.502***		6.888
				(2.839)		(1.530)
MVA					-0.788	-1.519
					(-0.754)	(-1.390)
Cointegration results						
F	8.095***	3.512**	6.991***	5.329***	4.406***	4.422***
ECMt−1	-0.761***	-0.617***	-0.876***	-0.717***	-0.734***	-0.946***
	(-7.689)	(-5.567)	(-8.024)	(-6.801)	(-6.209)	(-7.894)
Adj.R2	0.661	0.539	0.732	0.594	0.544	0.664
Diagnostic tests						
LM test	0.631	0.093	0.258	0.743	0.440	1.778
	(0.5418)	(0.9117)	(0.7754)	(0.4867)	(0.6497)	(0.1946)
ARCH	0.154	0.002	0.350	0.095	0.0001	0.3050
	(0.6977)	(0.9608)	(0.5591)	(0.7599)	(0.9900)	(0.5850)
CUSUM	S	S	S	S	S	S

Source: computation by the author based on e-views-12, ***, and **significant at the 1%, and 5 % levels, respectively.

Table 8: DVX equation in primary sector- long-run results-

variables	DVX models					
	(1,0,0,0,0)	(1,0,0,0,0,0)	(1,0,0,0,0,0)	(1,0,0,0,0,0)	(2,3,0,2,1,3)	(1,1,1,1,0,1,0,0,0)
	1	2	3	4	5	6
c	-52.265***	-51.316***	-33.083***	-55.923***	-44.217***	-38.295***
	(-5.258)	(-5.580)	(-3.117)	(-4.600)	(-4.215)	(-3.020)
RER	-0.010	-0.005	-0.024	-0.026	-0.172*	-0.073**
	(-0.264)	(-0.149)	(-0.830)	(-0.540)	(-2.158)	(-2.422)
GDPC	8.179***	8.105***	5.765***	8.661***	7.571***	6.570***
	(6.914)	(7.440)	(4.389)	(5.826)	(7.847)	(4.252)
Tariff	0.434**	0.388*	0.255*	0.438*	0.381**	0.144
	(2.115)	(1.922)	(1.712)	(2.060)	(2.349)	(1.395)
NR	0.005	0.011	0.006	0.004	-0.080**	0.013
	(0.152)	(0.318)	(0.268)	(0.106)	(-2.217)	(0.323)
FD		-1.103				-3.420
		(-0.545)				(-1.472)
NET			0.017*			0.015
			(1.937)			(1.612)
RL				0.518		0.706
				(0.680)		(1.404)
MVA					-0.124	0.7012
					(-0.689)	(0.084)
Cointegration results						
F	3.664**	3.087*	3.638**	3.157*	7.627***	2.855*
ECMt−1	-0.401***	-0.441***	-0.585***	-0.392***	-0.693***	-0.728***
	(-5.119)	(-5.177)	(-5.619)	(-5.235)	(-8.833)	(-6.544)
Adj.R2	0.269	0.276	0.331	0.284	0.693	0.599
Diagnostic tests						
LM test	1.748	1.789	0.968	1.721	1.049	1.029
	(0.1956)	(0.1895)	(0.3948)	(0.2013)	(0.3829)	(0.3797)
ARCH	0.026	0.084	0.179	0.0003	1.436	0.4316
	(0.8720)	(0.7739)	(0.6754)	(0.9872)	(0.2412)	(0.5164)
CUSUM	S	S	S	S	S	S

Source: computation by the author based on e-views-12, ***, and **significant at the 1%, and 5 % levels, respectively.

Table 9: FVA equation in primary sector- long-run results-

variables	LFVA models					
	ARDL (1,0,0,0,1)	(1,0,3,2,1,3)	(1,0,0,0,1,0)	(1,0,0,0,1,0)	(1,0,0,0,2,0)	(2,0,0,0,1,0,0,0,0)
	1	2	3	4	5	6
c	-23.407**	-55.971***	-13.609*	-23.791**	-18.846***	-7.330
	(-2.363)	(-4.046)	(-1.934)	(-2.255)	(-3.294)	(-0.724)
RER	-0.059	-0.105**	-0.073**	-0.064	-0.083**	-0.055*
	(-1.084)	(-2.167)	(-2.108)	(-1.928)	(-2.244)	(-1.980)
GDPC	4.497***	8.817***	3.185***	4.563***	4.590***	2.636*
	(3.884)	(4.936)	(3.683)	(3.660)	(7.201)	(2.030)
Tariff	-0.012	0.039	-0.011	-0.024	0.002	-0.002
	(-0.352)	(0.854)	(-0.349)	(-0.401)	(0.073)	(-0.079)
NR	0.051	0.204*	0.053**	0.051	-0.020	-0.010
	(1.266)	(2.995)	(2.237)	(1.181)	(-0.768)	(-0.301)
FD		-14.158***				2.010
		(-2.818)				(0.952)
NET			0.018**			0.014
			(2.430)			(1.602)
RL				0.195		-0.537
				(0.265)		(-1.055)
MVA					-0.303**	-0.138
					(-3.293)	(-1.214)
Cointegration results						
F	6.257***	5.043***	7.530***	5.177***	7.145***	3.494**
ECMt−1	-0.263***	-0.413***	-0.411***	-0.253***	-0.419***	-0.582***
	(-6.712)	(-7.102)	(-8.117)	(-6.730)	(-7.978)	(-7.239)
Adj.R2	0.555	0.793	0.651	0.556	0.711	0.721
Diagnostic tests						
LM test	1.297	2.625	0.019	1.442	0.193	0.615
	(0.2925)	(0.1292)	(0.8917)	(0.2580)	(0.6645)	(0.4436)
ARCH	2.649	0.704	0.203	1.567	1.346	0.065
	(0.1144)	(0.4089)	(0.6554)	(0.2271)	(0.2558)	(0.8004)
CUSUM	S	S	S	S	S	S

Source: computation by the author based on e-views-12, ***, and **significant at the 1%, and 5 % levels, respectively.

Table 10: DVX equation in High-Tech Manufacturing sector - long-run results-

variables	DVX models					
	(1,0,0,0,0)	(1,0,0,0,0,0)	(1,0,0,0,0,0)	(1,0,0,0,0,2)	(1,0,0,0,0,0)	(1,0,0,0,0,0,0,0,0)
	1	2	3	4	5	6
c	-30.415***	-30.385***	-38.258***	-28.834***	-34.859***	-54.769**
	(-5.087)	(-5.093)	(-3.991)	(-5.802)	(-3.812)	(-2.490)
RER	-0.017	-0.017	-0.005	-0.022	-0.015	-0.0005
	(-0.703)	(-0.670)	(-0.204)	(-1.136)	(-0.588)	(-0.015)
GDPC	5.397***	5.423***	6.396***	5.224***	5.755***	8.385***
	(7.710)	(7.719)	(5.431)	(8.591)	(6.308)	(3.203)
Tariff	0.160	0.139	0.211	0.151*	0.214	0.243
	(1.241)	(1.057)	(1.535)	(1.747)	(1.342)	(1.362)
NR	0.088***	0.093***	0.081***	0.064***	0.103**	0.126*
	(2.884)	(2.870)	(2.826)	(3.072)	(2.541)	(1.743)
FD		-0.757				-3.812
		(-0.564)				(-1.130)
NET			-0.009			-0.016
			(-1.102)			(-1.311)
RL				0.006		0.533
				(0.015)		(0.560)
MVA					0.081	0.101
					(0.705)	(0.575)
Cointegration results						
F	6.908***	5.811***	6.154***	8.449***	5.898***	4.509***
ECMt−1	-0.437***	-0.443***	-0.452***	-0.593***	-0.424***	-0.409***
	(-7.030)	(-7.102)	(-7.309)	(-8.676)	(-7.155)	(-7.971)
Adj.R2	0.526	0.532	0.549	0.654	0.536	0.597
Diagnostic tests						
LM test	1.015	0.790	1.576	1.974	2.016	2.421
	(0.3774)	(0.4656)	(0.2283)	(0.1746)	(0.1561)	(0.1144)
ARCH	2.292	2.087	2.379	2.081	2.126	1.953
	(0.1026)	(0.1154)	(0.1118)	(0.1293)	(0.1223)	(0.1239)
CUSUM	S	S	S	S	S	S

Source: computation by the author based on e-views-12, ***, and **significant at the 1%, and 5 % levels, respectively.

Table 11: FVA equation in High-Tech Manufacturing sector - long-run results-

variables	FVA models					
	(1,0,0,0,0)	(1,0,3,2,1,3)	(1,1,0,3,3,1)	(1,0,0,0,0,0)	(1,0,2,0,2,0)	(1,0,0,0,1,0,0,0,1)
	1	2	3	4	5	6
c	-22.385**	-50.061***	-5.950	-22,433***	-18.367***	-15.667*
	(-3.436)	(-4.266)	(-0.844)	(-3.324)	(-3.863)	(-2.016)
RER	-0.012	-0.089**	-0.095**	-0.013	-0.077**	-0.074**
	(-0.463)	(-2.210)	(-2.762)	(-0.448)	(-2.541)	(-2.289)
GDPC	4.372***	8.101***	2.293**	4.380***	4.531***	3.693***
	(5.739)	(5.381)	(2.775)	(5.492)	(8.284)	(3.748)
Tariff	-0.013	0.035	-0.018	-0.014	0.0111	0.001
	(-0.375)	(0.846)	(-0.044))	(-0.363)	(0.428)	(0.046)
NR	0.053*	0.183***	0.036**	0.052	-0.017	-0.032
	(1.966)	(3.314)	(2.560)	(1.911)	(-0.795)	(1.159)
FD		-12.663***				-0.604
		(-4.266)				(-0.333)
NET			0.025***			0.012
			(4.922)			(1.616)
RL				0.020		0.083
				(0.045)		(0.158)
MVA					-0.286***	-0.074
					(-3.316)	(-0.661)
Cointegration results						
F	4.922**	4.315***	6.842***	4.057***	3.833**	4.976***
ECMt−1	-0.455***	-0.463***	-0.764***	-0.454***	-0.487***	-0.482***
	(-5.934)	(-6.567)	(-8.189)	(-5.934)	(-5.906)	(-8.494)
Adj.R2	0.389	0.772	0.781	0.389	0.703	0.482
Diagnostic tests						
LM test	2.122	2.086	0.292	2.005	0.435	0.016
	(0.1061)	(0.1669)	(0.5975)	(0.1140)	(0.5172)	(0.9015)
ARCH	1.402	0.357	0.004	2.231	0.212	1.292
	(0.2641)	(0.5549)	(0.9502)	(0.1094)	(0.6487)	(0.2649)
CUSUM	S	S	S	S	S	S

Source: computation by the author based on e-views-12, ***, and **significant at the 1%, and 5 % levels, respectively.

Table 12: DVX equation in Low-Tech Manufacturing sector - long-run results-

variables	DVX models					
	(1,0,0,0,0)	(1,0,0,0,0,0)	(1,0,0,0,0,0)	(1,0,0,0,0,2)	(1,0,0,0,0,0)	(1,1,0,0,1,0,0,0,0)
	1	2	3	4	5	6
c	-28.963***	-28.929***	-36.137***	-28.166***	-32.212***	-50.481**
	(-4.892)	(-4.905)	(-3.779)	(-5.401)	(-3.606)	(-2.235)
RER	-0.014	-0.013	-0.003	-0.019	-0.012	-0.012
	(-0.334)	(-0.520)	(-0.096)	(-0.954)	(-0.467)	(-0.285)
GDPC	5.189***	5.215***	6.102***	5.113***	5.451**	7.950***
	(7.476)	(7.410)	(5.189)	(8.007)	(6.093)	(2.944)
Tariff	0.156	0.134	0.203	0.154*	0.195	0.218
	(1.230)	(1.037)	(1.491)	(1.716)	(1.260)	(1.175)
NR	0.082***	0.087***	0.077**	0.060**	0.093**	0.108
	(2.843)	(2.838)	(2.756)	(2.818)	(2.445)	(1.497)
FD		-0.781				-3.597
		(-0.586)				(-1.029)
NET			-0.008			-0.016
			(-1.002)			(-1.175)
RL				0.086		0.564
				(0.203)		(0.559)
MVA					0.059	0.046
					(0.524)	(0.228)
Cointegration results						
F	6.234***	5.257***	5.494***	7.506***	5.240***	3.227*
ECMt−1	-0.474***	-0.482***	-0.487***	-0.618***	-0.463***	-0.425***
	(-6.678)	(-6.755)	(-6.906)	(-8.178)	(-6.744)	(-6.841)
Adj.R2	0.514	0.520	0.533	0.634	0.519	0.561
Diagnostic tests						
LM test	0.976	0.779	1.444	2.318	1.700	2.455
	(0.3913)	(0.4704)	(0.2566)	(0.1428)	(0.2048)	(0.1141)
Arch	2.110	1.077	1.264	2.041	1.803	1.662
	(0.1008)	(0.6494)	(0.6121)	(0.1235)	(0.1738)	(0.2558)
CUSUM	S	S	S	S	S	S

Source: computation by the author based on e-views-12, ***, and **significant at the 1%, and 5 % levels, respectively.

Table 13: FVA equation in Low-Tech Manufacturing sector - long-run results-

variables	FVA models					
	(1,0,0,0,1)	(1,0,3,2,1,3)	(1,1,0,3,3,1)	(1,0,0,0,1,0)	(1,0,0,0,1,1)	(1,0,0,0,1,2,0,2,1)
	1	2	3	4	5	6
c	-21.538**	-50.061***	-5.950	-21.724*	-20.432***	-25.481**
	(-2.100)	(-4.266)	(-0.844)	(-2.024)	(-3.313)	(-2.174)
RER	-0.057	-0.089**	-0.095**	-0.059	-0.079*	-0.090**
	(-1.018)	(-2.210)	(-2.762)	(-0.963)	(-1.972)	(-2.529)
GDPC	4.306***	8.101***	2.293**	4.337***	4.613***	5.190***
	(3.589)	(5.381)	(2.775)	(3.415)	(6.420)	(3.275)
Tariff	-0.014	0.035	-0.018	-0.016	0.015	-0.003
	(-0.249)	(0.846)	(-0.436)	(-0.265)	(0.432)	(-0.102)
NR	0.054	0.183***	0.036**	0.054	0.003	0.022
	(1.271)	(3.314)	(2.560)	(1.218)	(0.141)	(0.696)
FD		-12.663***				-2.886
		(-3.111)				(-1.145)
NET			0.025***			0.005
			(4.922)			(0.532)
RL				0.084		0.714
				(0.117)		(1.097)
MVA					-0.214**	-0.133
					(-2.238)	(-1.111)
Cointegration results						
F	5.571***	4.315***	6.842***	4.589***	6.365***	4.967***
ECMt−1	-0.252***	-0.463***	-0.764***	-0.249***	-0.389***	-0.530***
	(-6.333)	(-6.569)	(-8.189)	(-6.337)	(-7.495)	(-8.915)
Adj.R2	0.535	0.772	0.781	0.535	0.655	0.763
Diagnostic tests						
LM test	1.114	2.086	0.291	1.256	0.183	0.133
	(0.3453)	(0.1669)	(0.5975)	(0.3044)	(0.6726)	(0.7210)
ARCH	0.948	0.357	0.004	0.918	2.361	0.055
	(0.5414)	(0.5549)	(0.9502)	(0.5609)	(0.1135)	(0.8167)
CUSUM	S	S	S	S	S	S

Source: computation by the author based on e-views-12, ***, and **significant at the 1%, and 5 % levels, respectively.

Table 14: DVX equation in High-Tech Services sector - long-run results-

variables	DVX models				
	(1,0,0,0)	(4,0,0,0,0)	(1,0,0,0,0)	(2,0,0,0,2)	(1,0,0,0,0,0,0)
	1	2	3	4	5
c	-19.487***	-20.202***	-22.532***	-18.929***	-40.649**
	(-6.178)	(-11.360)	(-3.385)	(-5.361)	(-2.431)
RER	-0.011	-0.032*	-0.005	-0.022	0.002
	(-0.371)	(-1.921)	(0.162)	(-0.986)	(0.047)
GDPC	4.089***	4.284***	4.490***	4.059***	6.961***
	(10.360)	(18.509)	(5.186)	(8.795)	(3.096)
NR	0.079**	0.068***	0.073**	0.037*	0.102*
	(2.633)	(3.421)	(2.335)	(1.797)	(2.197)
FD		-2.635**			-4.446
		(-2.756)			(-1.285)
NET			-0.005		-0.018
			(-0.515)		(-1.311)
RL				0.049	0.715
				(0.106)	(0.4741)
Cointegration results					
F	5.716***	8.161***	4.674***	6.298***	3.911**
ECMt−1	-0.508***	-0.907***	-0.524***	-0.783***	-0.481***
	(-5.729)	(-7.823)	(-5.783)	(-6.810)	(-6.357)
Adj.R2	0.462	0.689	0.467	0.565	0.519
Diagnostic tests					
LM test	2.021	2.809	1.953	0.840	2.156
	(0.1536)	(0.1101)	(0.1638)	(0.3698)	(0.1396)
Arch	0.819	1.347	0.868	2.243	0.912
	(0.3730)	(0.3002)	(0.3592)	(0.1454)	(0.3474)
CUSUM	S	S	S	S	S

Source: computation by the author based on e-views-12, ***, and **significant at the 1%, and 5 % levels, respectively.

Table 15: FVA equation in High-Tech Services sector - long-run results-

variables	FVA models				
	(1,0,0,1)	(1,0,0,1,0)	(2,1,0,1,1)	(1,0,0,1,3)	(2,1,1,1,0,0,0)
	1	2	3	4	5
c	-24.744***	-28.042***	-11.436***	-12.331	-12.529**
	(-4.013)	(-5.457)	(-3.477)	(-1.188)	(-2.453)
RER	-0.013	-0.096	-0.083***	-0.040	-0.068**
	(-1.192)	(-1.369)	(-3.445)	(-0.609)	(-3.449)
GDPC	4.738***	5.206***	2.928***	2.993**	3.063***
	(6.193)	(7.625)	(6.917)	(2.176)	(4.486)
NR	0.022	0.041	0.028*	0.089	0.018
	(0.437)	(1.005)	(1.811)	(1.469)	(1.445)
FD		-2.860			-0.366
		(-1.210)			(-0.371)
NET			0.022***		0.018***
			(4.258)		(3.713)
RL				-2.387	-0.131
				(-1.156)	(-0.473)
Cointegration results					
F	4.940***	4.379**	5.327***	5.051***	3.534**
ECMt−1	-0.186***	-0.254***	-0.733***	-0.254***	-0.834***
	(-5.339)	(-5.615)	(-6.291)	(-6.154)	(-6.220)
Adj.R2	0.442	0.469	0.652	0.581	0.677
Diagnostic tests					
LM test	1.388	1.327	1.536	1.603	0.274
	(0.2690)	(0.2848)	(0.2408)	(0.2286)	(0.6068)
ARCH	0.052	0.100	1.029	0.434	1.004
	(0.8203)	(0.7536)	(0.3191)	(0.5157)	(0.3248)
CUSUM	S	S	S	S	S

Source: computation by the author based on e-views-12, ***, and **significant at the 1%, and 5 % levels, respectively.

Figures

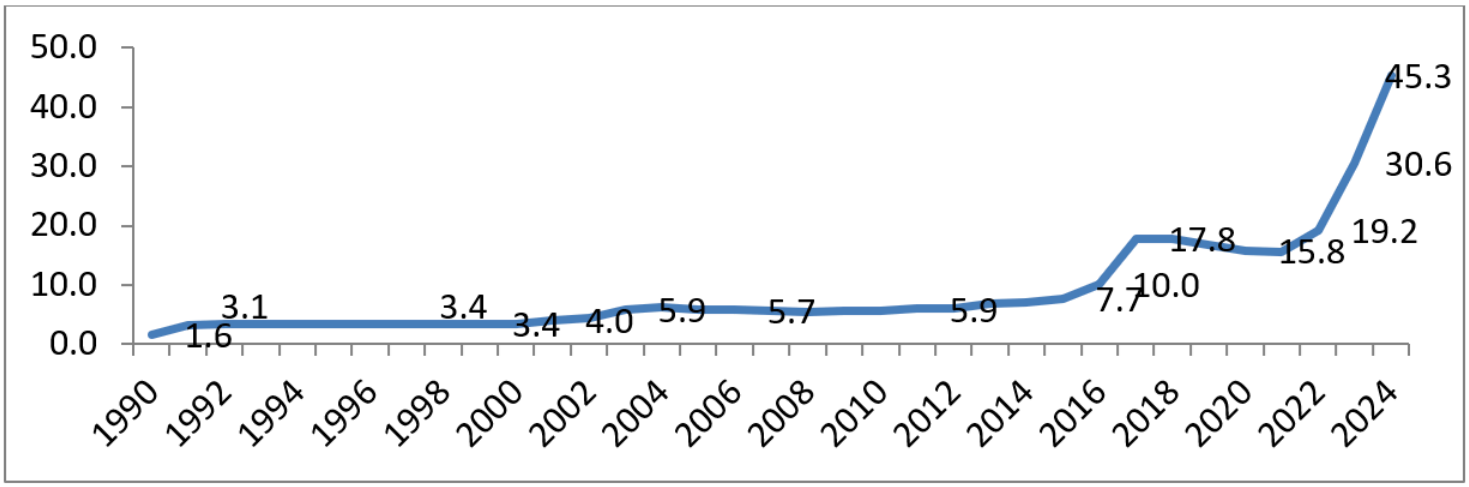


Figure 1

Nominal exchange rate EGP/US$ 1990-2024

Source: World Development Indicator (WDI) online database of the World Bank, (2025).

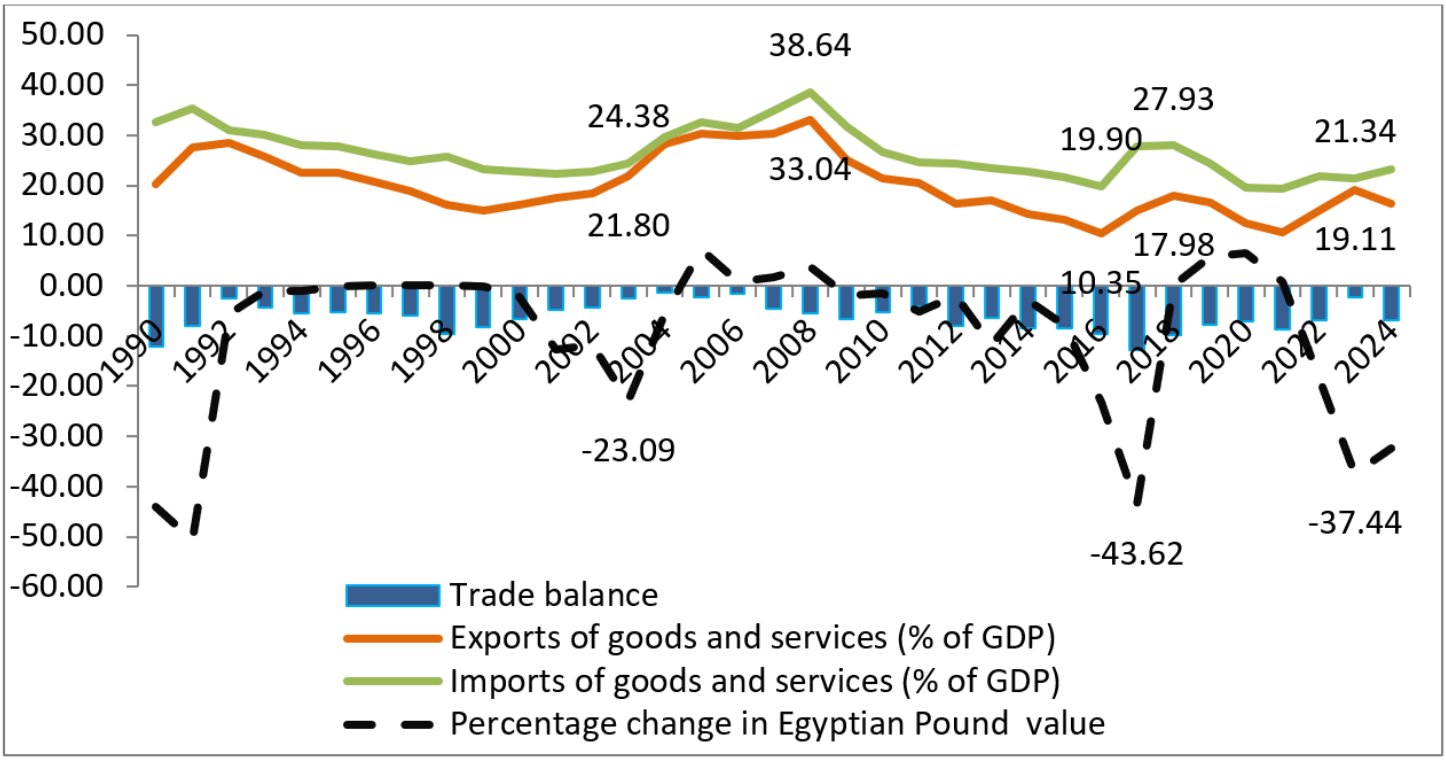


Figure 2

Egypt's trade % GDP, and percentage change in Egyptian pound value against U.S $

Source: World Development Indicator (WDI) online database of the World Bank, (2025).

*Trade balance and percentage change in exchange rate calculated by the author.

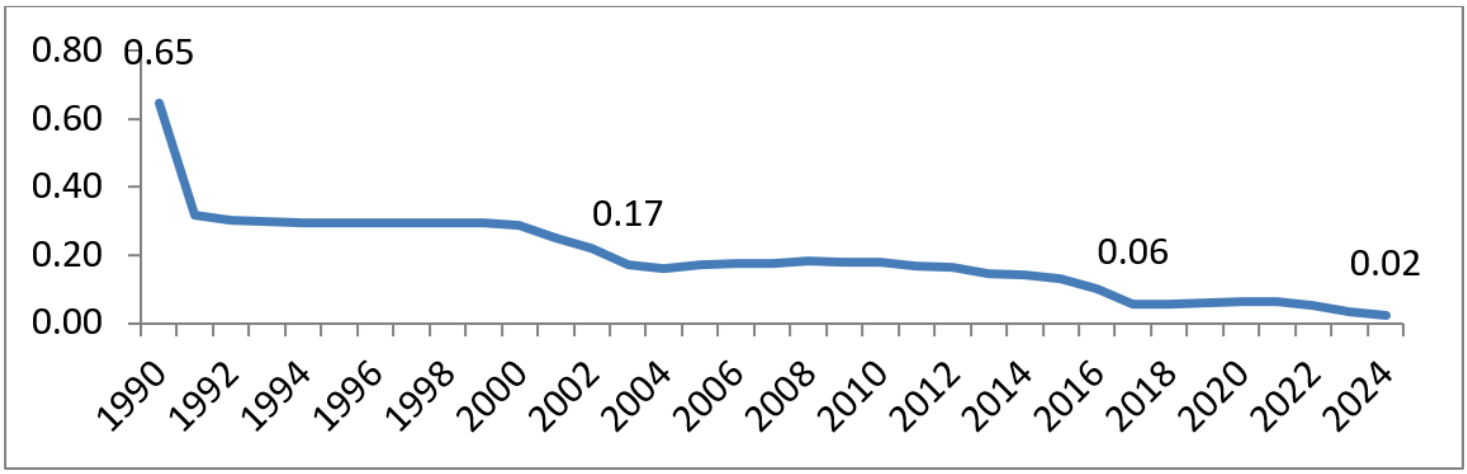


Figure 3

Evolution of the exchange rate of the Egyptian Pound against the U.S. dollar

Source: Calculated by the author, it depends on the World Bank online database, (2025).

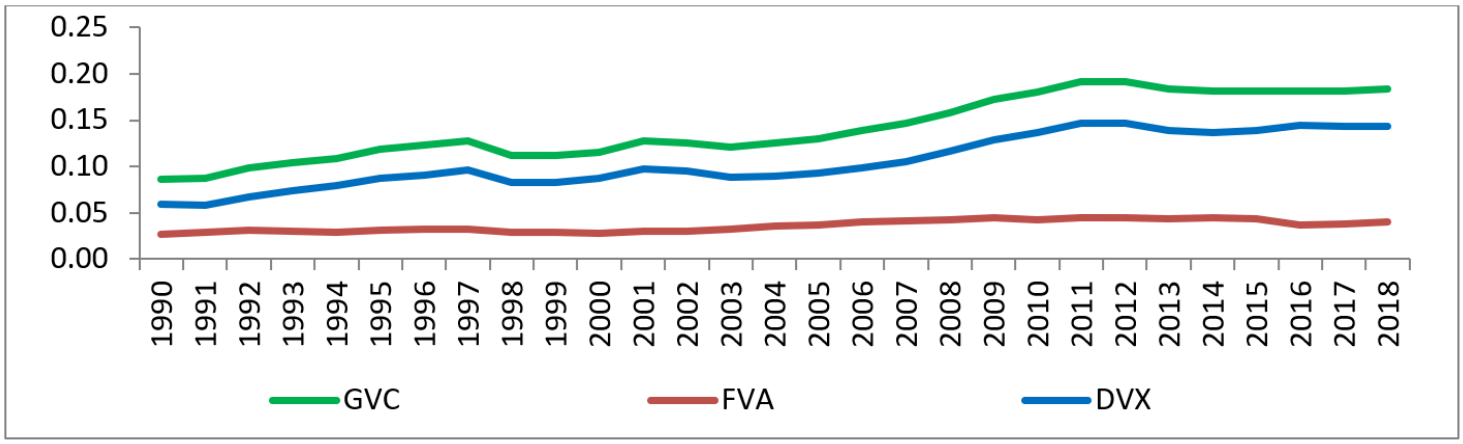


Figure 4

Egypt's GVCs participation during the period 1990-2018 (% from world)

Source: Constructed by the authors using UNCTAD-EORA dataset, (2025).

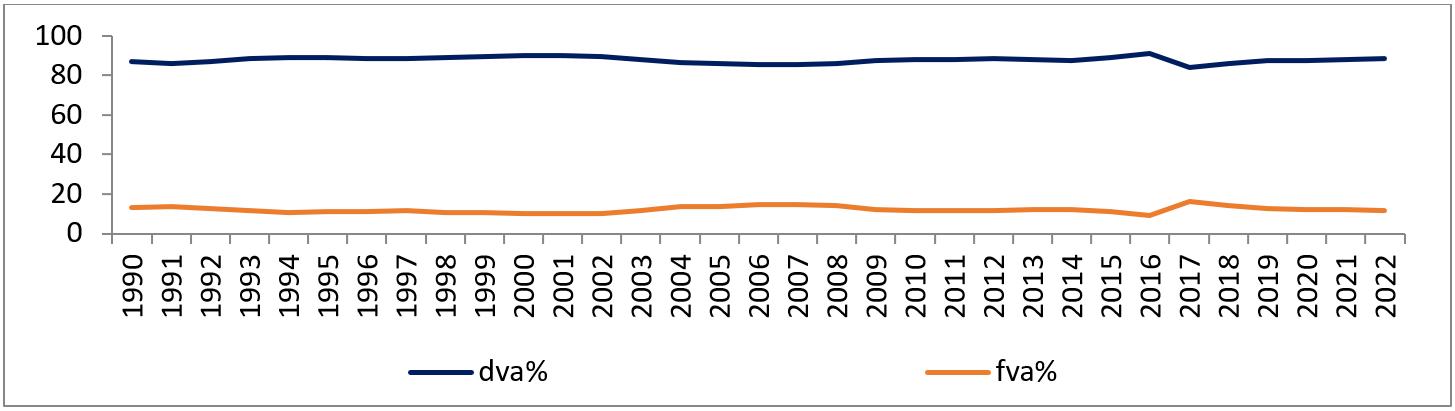


Figure 5

Egypt's percentage DVA and FVA in export during the period 1990-2022

Source: Constructed by the authors using UNCTAD-EORA dataset, (2025).

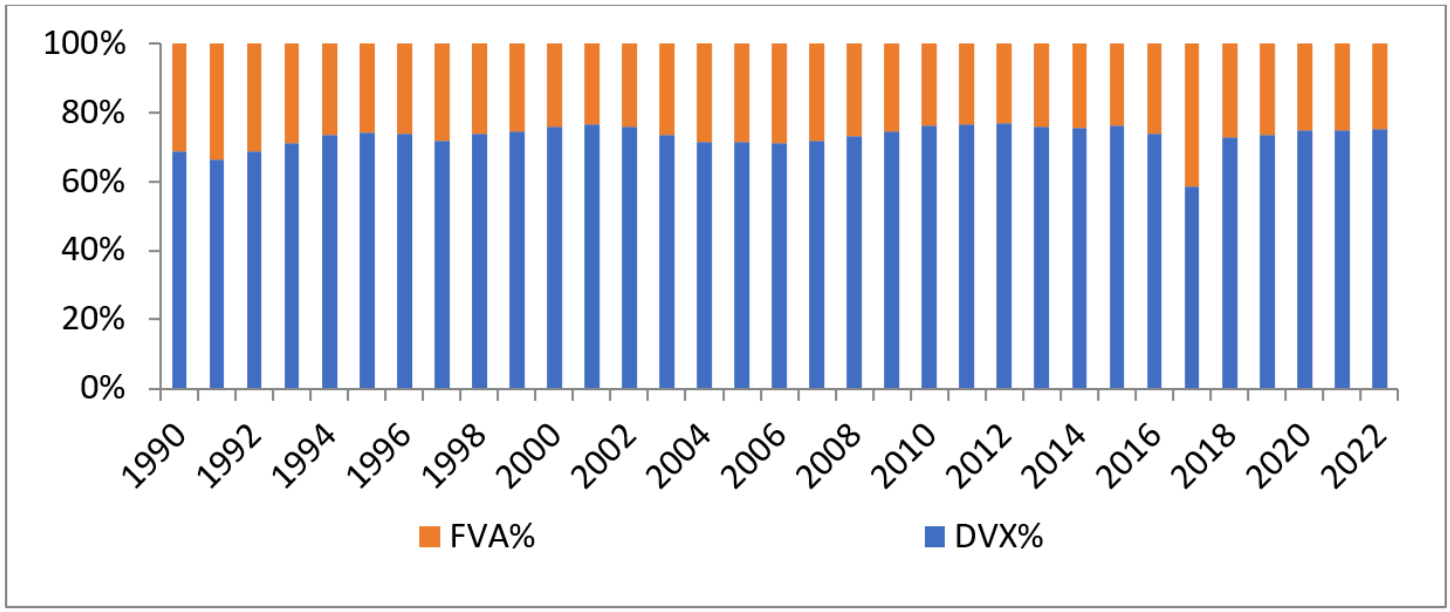


Figure 6

The Share of Domestic and Foreign Value-Added Components in GVCs (1990-2022)

Source: Constructed by the authors using UNCTAD-EORA dataset, (2025).

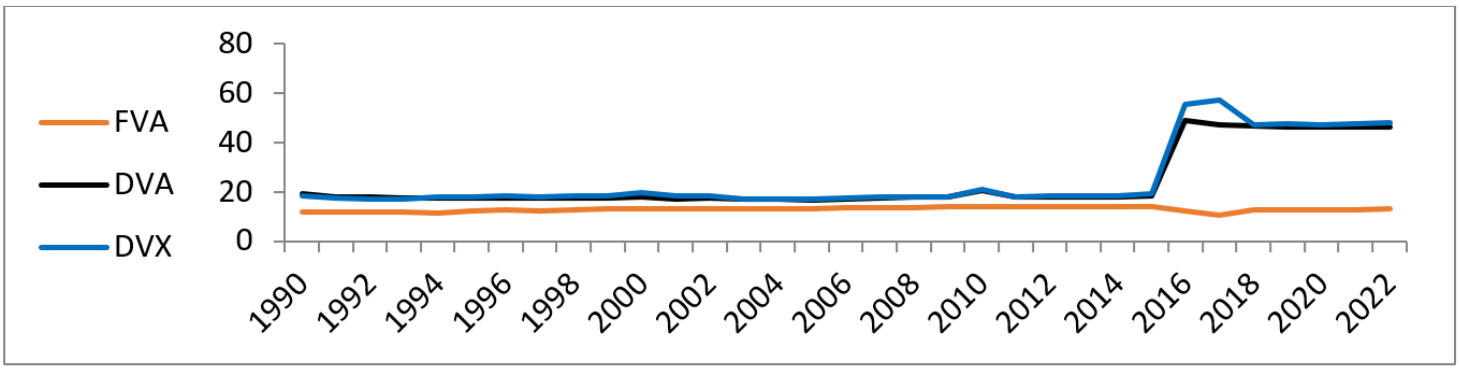


Figure 7

Egypt's DVX and FVA in Primary sector (% total DVX, FVA) during the period 1990-2022

Source: Constructed by the authors using UNCTAD-EORA dataset, (2025).

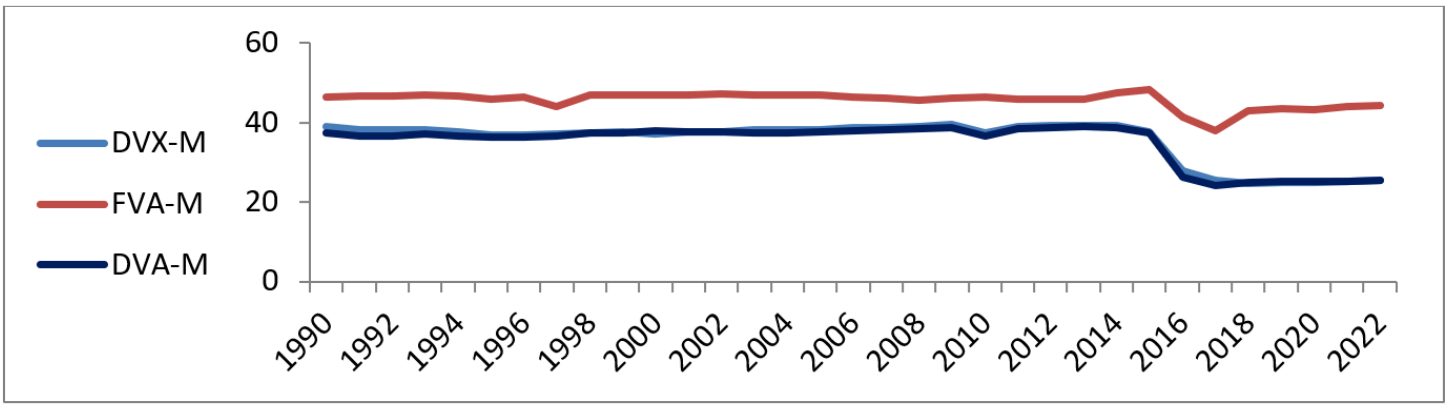


Figure 8

Egypt's DVX and FVA in Manufacturing sector(% total DVX, FVA) (1990-2022)

Source: Constructed by the authors using UNCTAD-EORA dataset, (2025).

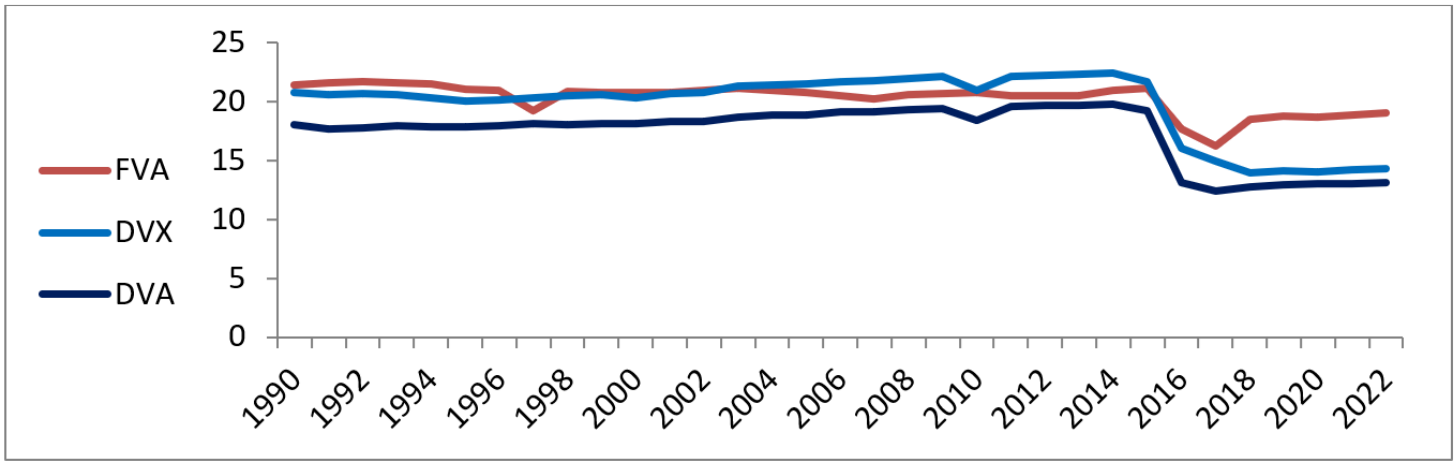


Figure 9

Egypt's DVX and FVA in High-Tech Manufacturing sector(% total DVX, FVA) (1990-2022)

Source: Constructed by the authors using UNCTAD-EORA dataset, (2025).

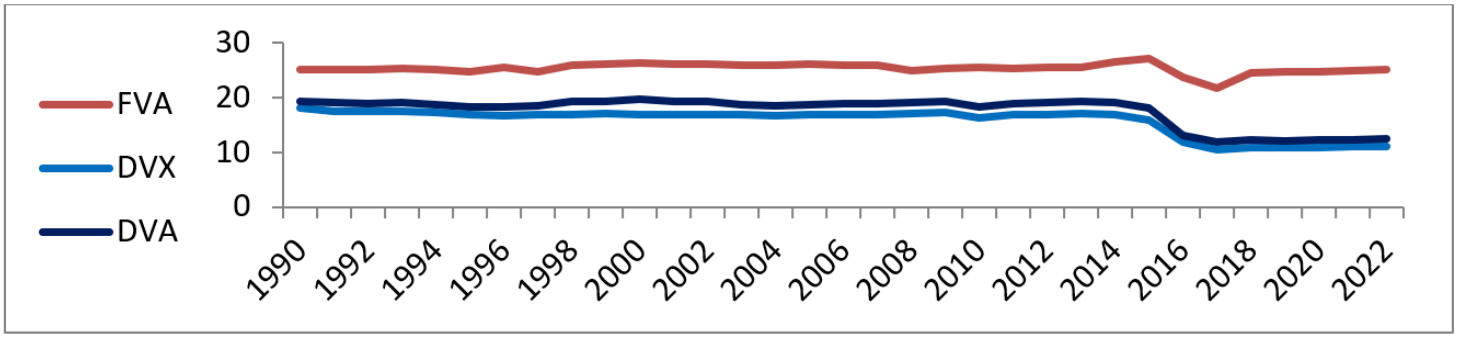


Figure 10

Egypt's DVX and FVA in Low-Tech Manufacturing sector(% total DVX, FVA) (1990-2022)

Source: Constructed by the authors using UNCTAD-EORA dataset, (2025).

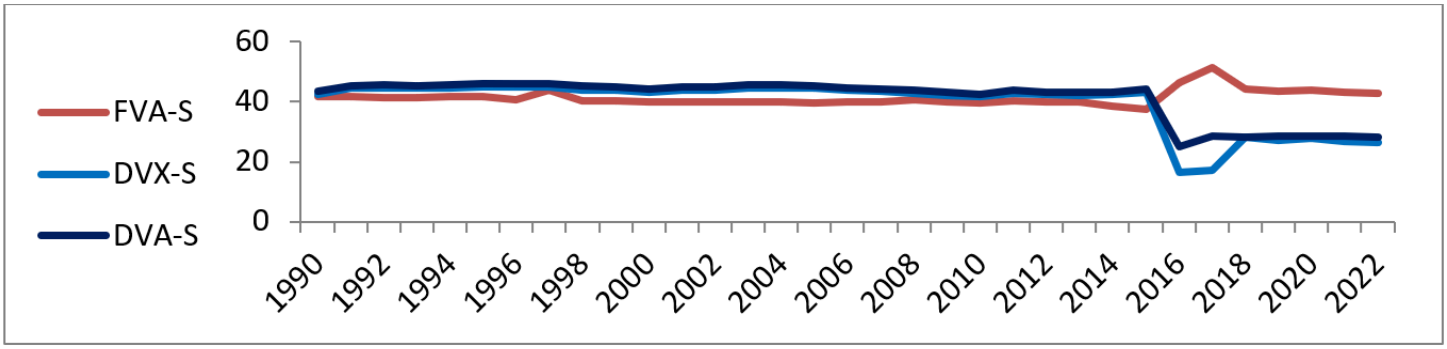


Figure 11

Egypt's DVX and FVA in Servicies sector(% total DVX, FVA) (1990-2022)

Source: Constructed by the authors using UNCTAD-EORA dataset, (2025).

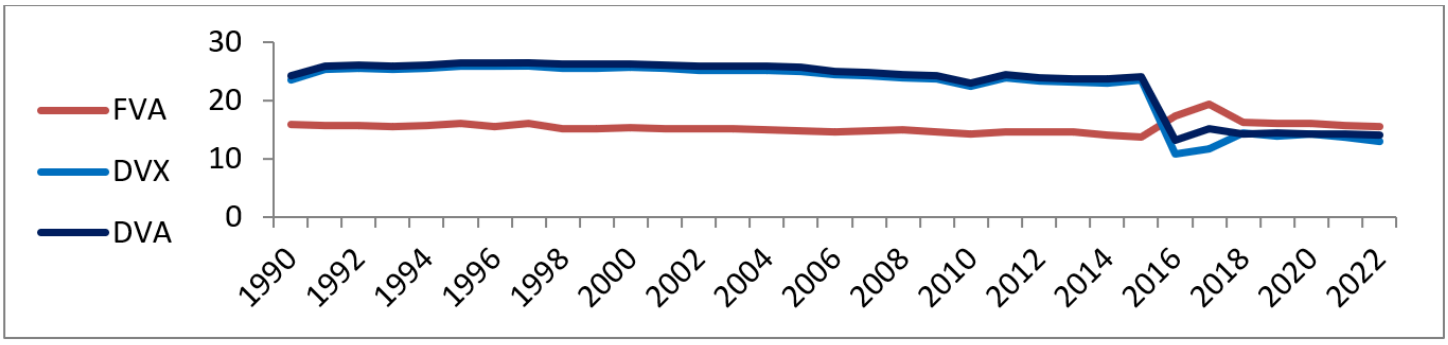


Figure 12

Egypt's DVX and FVA in High-Tech Services sector(% total DVX, FVA) (1990-2022)

Source: Constructed by the authors using UNCTAD-EORA dataset, (2025).

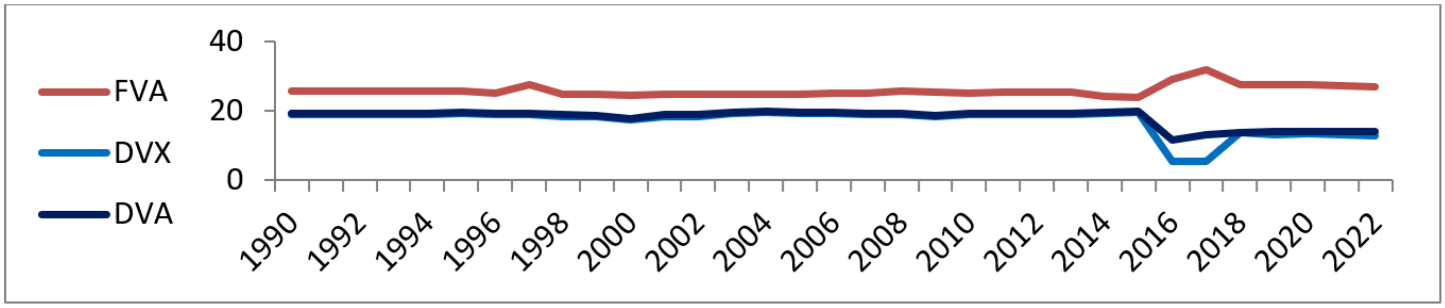


Figure 13

Egypt's DVX and FVA in Low-Tech Servicies sector(% total DVX, FVA) (1990-2022)

Source: Constructed by the authors using UNCTAD-EORA dataset, (2025).

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Appendix.docx