# Da Armadilha da Especialização Produtiva à Superação da Restrição Externa ao Crescimento em Moçambique: Uma Análise à Luz da Lei de Thirlwall (1980–2024)

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**Resumo**
Este artigo investiga a validade empírica da Lei de Thirlwall para a economia moçambicana, com o objetivo de avaliar a existência de uma restrição externa ao crescimento econômico no longo prazo. Para tanto, emprega-se a abordagem ARDL, por meio da qual são estimadas as elasticidades-renda das exportações e das importações, bem como testada a presença de cointegração entre as variáveis. Os resultados indicam que a elasticidade-renda das exportações é inferior à das importações, resultando em uma razão de elasticidades menor que a unidade. Com base nesse resultado e no crescimento da renda mundial, aproximada por uma média ponderada do crescimento do produto interno bruto dos principais parceiros comerciais de Moçambique, estimou-se uma taxa de crescimento compatível com o equilíbrio do balanço de pagamentos de 2,359%, significativamente inferior ao crescimento médio observado de 6,045% no período analisado. Essa discrepância sugere que a economia tem crescido acima do limite imposto pela restrição externa, sustentada, em parte, por mecanismos de financiamento externo, como o endividamento. Os resultados não refutam a Lei de Thirlwall, mas apontam para um relaxamento intertemporal da restrição externa, às custas do aumento das vulnerabilidades macroeconômicas. Conclui-se que a sustentabilidade do crescimento requer transformações estruturais capazes de elevar a elasticidade das exportações, reduzir a dependência de importações e assegurar uma gestão responsável do endividamento externo.
**Palavras-Chave:** Especialização Produtiva; Lei de Thirlwall; Restrição Externa; Elasticidades Comerciais; Moçambique.

**Abstract**
This article investigates the empirical validity of Thirlwall's Law in the case of the Mozambican economy, with the aim of assessing the existence of a long-run external constraint on economic growth. To this end, the ARDL approach is employed, through which the income elasticities of exports and imports are estimated, as well as the presence of cointegration among the variables is tested. The results indicate that the income elasticity of exports is lower than that of imports, yielding an elasticity ratio below unity. Based on this result and on world income growth, approximated by a weighted average of GDP growth rates of Mozambique's main trading partners, the balance-of-payments–consistent growth rate is estimated at 2.359%, significantly lower than the observed average growth rate of 6.045% over the period analysed. This discrepancy suggests that the economy has grown above the limit imposed by the external constraint, partly sustained by external financing mechanisms, such as debt accumulation. The results do not reject Thirlwall's Law but point to an intertemporal relaxation of the external constraint, at the cost of increasing macroeconomic vulnerabilities. It is concluded that the sustainability of growth requires structural transformations capable of increasing export income elasticity, reducing import dependence, and ensuring responsible management of external debt.
**Keywords:** Productive Specialization; Thirlwall's Law; External Constraint; Trade Elasticities; Mozambique.

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## 1. Introduction

Dependence on natural resources remains a central structural characteristic of many developing economies. The exploitation of mineral and energy resources generates economic surpluses associated with Ricardian rents, a concept derived from Ricardo (1817), according to which such rents arise from the relative scarcity and heterogeneity in the quality of natural resources. Although these rents may support episodes of economic growth through the expansion of exports, increased fiscal revenues, and foreign exchange inflows, their predominance often contributes to the persistence of poorly diversified productive structures, greater exposure to external shocks, and a limited capacity to sustain long-term economic growth.

The literature on the resource curse argues that primary commodity-exporting economies face persistent risks of income traps, macroeconomic volatility, and limited structural transformation (Sachs & Warner, 2001; Arezki et al., 2017; Alexeev & Conrad, 2009; Brunnschweiler & Bulte, 2008; Papyrakis & Gerlagh, 2004; Mulwa & Mariara, 2016). From this perspective, the problem does not lie in resource abundance per se, but rather in the institutional and productive capacity to transform revenues derived from natural resources into human capital accumulation, technological progress, and economic diversification (Collier, 2017; Sala-i-Martin & Subramanian, 2013; Van der Ploeg, 2011; Wright & Czelusta, 2004).

On the other hand, sustainable development trajectories are associated with the generation of Schumpeterian rents, derived from innovation, technological progress, and structural transformation, in the tradition of Schumpeter (1911, 1942). The economic literature emphasizes that greater productive sophistication and economic complexity are associated with more robust long-term growth trajectories (Hausmann et al., 2014; Hidalgo, 2021). In this context, structural transformation plays a central role by enhancing the capacity for knowledge generation and diffusion, as well as productive diversification.

From the perspective of Thirlwall's Law, this process acquires an additional dimension. Long-term economic growth is constrained by the balance of payments and is determined by the ratio between the income elasticity of exports and the income elasticity of imports. Therefore, the productive structure of an economy, and consequently the type of rents that predominate, directly influences its growth capacity. More sophisticated economies tend

to exhibit higher income elasticity of exports, thereby expanding their ability to grow without generating persistent external imbalances.

In contrast, economies specialized in commodities, typically associated with Ricardian rents, tend to exhibit relatively low income elasticity of exports, reflecting the limited differentiation of their products. At the same time, they remain highly dependent on imports of manufactured and technological goods, which are characterized by high income elasticity. This structural pattern implies an external constraint on growth, insofar as the expansion of domestic income generates increasing pressures on the balance of payments.

In this context, the exchange rate plays a complementary role in this process by influencing external competitiveness and the composition of exports. Persistent exchange rate misalignments may negatively affect export elasticity and reinforce patterns of specialization based on static comparative advantages, whereas exchange rate regimes consistent with competitiveness may foster productive diversification and the expansion of the tradable sector. In this sense, exchange rate dynamics operate as a transmission mechanism between productive structure and the external constraint.

Mozambique represents a relevant empirical case for examining this dynamic. Since the 1990s, the country has experienced a strong expansion of mineral and energy exports, consolidating its position as a primary commodity-exporting economy. The central question is whether this pattern has been capable of sustaining growth consistent with external equilibrium or whether it has reinforced an external constraint associated with the predominance of Ricardian rents.

Thus, this article investigates the extent to which the rent structure in Mozambique influences its external constraint on growth over the period 1980–2024. Specifically, it seeks to test the hypothesis that the predominance of Ricardian rents is associated with unfavorable trade elasticities, thereby constraining economic growth, or whether there is evidence of a transition toward a regime based on Schumpeterian rents.

Methodologically, this study employs Thirlwall's Law as its empirical framework, estimating the income elasticities of exports and imports and comparing the observed growth rate with the growth rate consistent with balance-of-payments equilibrium. This approach makes it possible to assess whether Mozambique’s economic growth has been

constrained by its external insertion and by the nature of its productive structure, thereby contributing to the debate on development in commodity-dependent economies.

To achieve the objective of this study, the article is structured into four sections, in addition to this introduction. The second section presents the theoretical and empirical literature review. The third section focuses on the methodological procedures. The fourth section discusses the research findings. Finally, the last section presents the concluding remarks, highlighting the main contributions of the study.

## 2. STRUCTURAL TRANSFORMATION: FROM RICARDIAN TO SCHUMPETERIAN RENTS — A LITERATURE REVIEW

### 2.1 Ricardian rents and static comparative advantages

The concept of Ricardian rent, derived from Ricardo (1817), refers to the surpluses generated by the heterogeneity and relative scarcity of natural factors. In the contemporary context, these rents are associated with the exploitation of exhaustible natural resources and are independent of innovation or technological progress.

The modern literature interprets these rents as an expression of static comparative advantages. Sachs and Warner (2001) argue that natural resource-intensive economies tend to exhibit lower long-term growth, a hypothesis later qualified by Alexeev & Conrad (2009) and Brunnschweiler & Bulte (2008), who emphasize the role of institutions in this process. Paul Collier (2017) and Xavier Sala-i-Martin & Arvind Subramanian (2013) reinforce this view by showing that the impact of rents depends on the capacity to transform them into productive investment.

Hausmann et al. (2014) and Hidalgo (2021) argue that the productive structure conditions long-term economic growth. Economies specialized in commodities tend to exhibit low economic complexity and limited productive diversification.

This specialization has direct implications for the ratio of elasticities, since commodity-exporting economies generally exhibit low income elasticity of exports and a high dependence on imports of manufactured goods, which implies high income elasticity of

imports. This structural pattern limits the capacity for sustained growth by imposing an external constraint through the balance of payments[1].

Thus, Ricardian rents not only reflect static advantages, but also negatively condition the dynamics of economic growth by restricting the capacity for expansion consistent with external equilibrium.

### 2.2 Dutch disease and the real exchange rate

The Dutch disease model, formalized by Corden & Neary (1982), provides the main transmission mechanism through which Ricardian rents affect the productive structure. Natural resource booms generate exchange rate appreciation through the spending effect and the resource movement effect, thereby reducing the competitiveness of the manufacturing sector..

Williamson (1990) and Edwards (1989, 1994) show that persistent exchange rate misalignments undermine external performance, while Rodrik (2008) and Frenkel & Rapetti (2011) emphasize that competitive exchange rates are essential to sustain growth through the tradable sector.

For Thirlwall (1979), the exchange rate influences not only competitiveness, but also the structure of international trade elasticities. Exchange rate overvaluation reduces the participation of sectors with higher technological content, compressing the income elasticity of exports and reinforcing the external constraint. In addition, Aghion et al. (2009, 2016) demonstrate that exchange rate volatility reduces investment and innovation, thereby hindering productive diversification. In commodity-dependent economies, this process reinforces specialization in low-elasticity sectors, consolidating a growth pattern constrained by the balance of payments. Thus, the exchange rate acts as a central link between Ricardian rents and the external constraint, directly influencing long-term growth capacity.

### 2.3 Schumpeterian rents and dynamic growth

The Schumpeterian approach associates economic growth with innovation and creative destruction, following the tradition of Schumpeter (1911, 1942). Schumpeterian rents

[1] Thirlwall (1979).

emerge from the capacity to innovate, differentiate products, and exploit economies of scale, and are therefore dynamic and endogenous in nature.

The endogenous growth literature, particularly the work of Aghion et al. (2009, 2016), reinforces the view that innovation, human capital, and macroeconomic stability are central determinants of productivity. Hausmann et al. (2014) and Hidalgo (2021) complement this perspective by emphasizing that greater economic complexity is associated with more robust growth trajectories.

According to Thirlwall's Law, more sophisticated economies tend to exhibit higher income elasticity of exports, since they produce differentiated goods with greater technological content. Moreover, productive diversification may reduce dependence on imports of high-technology goods.

Rodrik (2016, 2021) emphasizes the role of the tradable sector in structural transformation. His analysis of premature deindustrialization highlights that the loss of industrial capacity undermines the generation of exports with high income elasticity, thereby reinforcing the external constraint.

Thus, Schumpeterian rents not only enhance productivity, but also transform the external insertion of the economy, enabling the sustenance of higher growth rates consistent with balance-of-payments equilibrium.

### 2.4 Structural transformation and the transition between rent regimes

The literature converges on the idea that economic development depends on the transition from static to dynamic comparative advantages. This process involves the reallocation of resources toward more productive, technology-intensive sectors with greater learning potential (Hausmann et al., 2014; Hidalgo, 2021).

Van der Ploeg (2011) and Arezki et al. (2017) emphasize that this transition depends on institutional quality and the management of natural resource rents, while Collier (2017) highlights the role of public policies in transforming these rents into productive investment.

For Thirlwall (1979), this transition can be interpreted as a change in the structural parameters that determine economic growth. Specifically, economic development occurs when there is an increase in the income elasticity of exports and a relative reduction in the income elasticity of imports.

As argued by Rodrik (2008) and Frenkel & Rapetti (2011), the exchange rate plays a crucial role in this process by influencing the competitiveness of tradable sectors. Exchange rate regimes that avoid overvaluation contribute to productive diversification and to the expansion of sectors with greater technological content.

Thus, the transition between rent regimes is not automatic, but rather depends on the interaction between productive structure, institutions, and macroeconomic policy. The ability to relax the external constraint on growth, as predicted by Thirlwall's Law, constitutes the main criterion for evaluating the success of this transformation.

### 2.5 Thirlwall's Law and the external constraint on economic growth

Thirlwall's Law provides an analytical framework that integrates the different strands of the literature discussed above by establishing that long-term economic growth is constrained by the balance of payments.

Thirlwall (1979) considers the constraints arising from the income-demand elasticities of exports and imports. The model is fundamental for understanding differences in economic growth rates across countries and is based on the balance-of-payments equilibrium condition, which can be expressed as follows::

$$P_d X = P_f M E \quad (2.1)$$

where:

X = volume of exports;;

$P_d$ = domestic price of exported goods;

M = volume of imports

$P_f$= foreign-currency price of imports

E = exchange rate.

In growth-rate terms, the rate of change in the value of exports is equal to the rate of change in the value of imports, such that:

$$p_d + x = p_f + m + e \quad (2.2)$$

It is well known that external demand for exported goods and domestic demand for imported goods depend on the exchange rate, the prices of domestic and foreign goods, and domestic and foreign income levels. Thus:

$$M = \mathrm{a}\left(P_f E / P_d\right)^{\psi} Y^{\pi} \quad (2.3)$$

$$X = \mathrm{b}\left(P_d / P_f E\right)^{\eta} Z^{\varepsilon} \quad (2.4)$$

It is assumed that $a$ and $b$ are constants; $\psi$ represents the price elasticity of imports; $\pi$ is the income elasticity of demand for imports; $\eta$ denotes the price elasticity of exports; and $\varepsilon$ represents the income elasticity of international demand for domestic exports[2]. Y represents domestic income, while $Z$ denotes the income of trading partners. Taking logarithms once again and differentiating equations 2.3 and 2.4 with respect to time yields:

$$m = \psi(p_f + e - p_d) + \pi y \quad (2.5)$$

$$x = \eta(p_d - p_f - e) + \varepsilon z \quad (2.6)$$

Substituting equations 2.5 and 2.6 into equation 2.2 and solving for $y$ yields:

$$p_d + \eta(p_d - p_f - e) + \varepsilon z = p_f + \psi(p_f + e + p_d) + \pi y + e \quad (2.7)$$

$$y = \left(\frac{1+\eta+\psi}{\pi}\right)(p_d - p_f - e) + \left(\frac{\varepsilon}{\pi}\right) z \quad (2.8)$$

For the sake of simplicity, it may be assumed that the prices of domestic and foreign goods remain constant in the long run. Thus, there is convergence between domestic and international prices $(p_d = p_f = 0)$, and it is also assumed that exchange rate depreciation cannot persist indefinitely over time $(e = 0)$, such that:

$$y = \frac{\varepsilon}{\pi} z \quad (2.9)$$

For Thirlwall, a country's long-term growth depends on the ratio between the income elasticities of exports and imports; that is, the trajectory of a country's economic dynamics is explained by the ratio of these elasticities.

This formulation highlights that long-term growth is not determined solely by internal factors, but fundamentally by the capacity to generate foreign exchange earnings. In this context, the productive structure plays a central role insofar as it determines the values of $\varepsilon$ and $\pi$.

Thus, it can be argued that economies based on Ricardian rents tend to exhibit low income elasticity of exports, since commodities are characterized by limited differentiation and lower sensitivity to world income. At the same time, these economies tend to display high income elasticity of imports, reflecting their dependence on manufactured and

[2] It is assumed that the parameters follow the assumptions of the traditional demand functions. The price elasticities of exports and imports are negative, while the income elasticities of export and import demand are positive, such that $\eta$and $\psi < 0$, and $\varepsilon$ and $\pi > 0$.

technological goods. Consequently, their growth rate becomes constrained, consistent with the existence of a strong external constraint.

Conversely, economies that manage to transition toward a regime based on Schumpeterian rents alter this structural configuration. Productive diversification and increasing economic complexity raise the income elasticity of exports ($\varepsilon$), while relatively reducing dependence on imports ($\pi$). As a result, the ratio $\frac{\varepsilon}{\pi}$ expands, allowing for higher growth rates consistent with balance-of-payments equilibrium.

This interpretation allows for an analytical formalization of the connection between the different approaches discussed. The resource curse can be understood as the manifestation of a structural pattern in which $\varepsilon$ is persistently low and $\pi$ high. Dutch disease operates as a mechanism that reinforces this pattern by inducing exchange rate appreciation and reducing the participation of sectors with higher technological content, thereby negatively affecting export elasticity. Premature deindustrialization, in turn, limits the capacity to generate higher value-added goods, preventing increases in $\varepsilon$. Finally, institutional weaknesses undermine the ability to transform Ricardian rents into productive investment, hindering structural changes in these elasticities.

Thus, Thirlwall's Law provides a unifying synthesis: long-term economic development depends on the capacity to alter the structural parameters of international trade. The transition from Ricardian rents to Schumpeterian rents can therefore be interpreted as a process of transformation in trade elasticities, in which sustained growth is conditioned by the ability to relax the external constraint imposed by the balance of payments.

### 2.6 Empirical Evidence

The empirical literature on natural resources, exchange rates, and economic growth presents heterogeneous results, but converges on the idea that natural resource abundance does not automatically translate into sustained economic growth. This evidence can be organized along two analytical dimensions: (i) the external constraint on growth and (ii) the structural effects of Ricardian rents on productive dynamics.

The analytical foundation of the external constraint is established by Thirlwall (1979), who, based on a macroeconomic consistency approach applied to post-war United Kingdom, demonstrates that the long-run growth rate is constrained by balance-of-payments equilibrium. This result is extended by Thirlwall & Hussain (1982), who, using

data for developing countries over the period 1951–1969 and econometric regressions, show that observed growth tends to converge toward the rate consistent with the external constraint.

Additional evidence reinforces this proposition. McCombie (1989), using data for OECD countries over the period 1950–1985 and long-run econometric tests, shows that differences in growth rates reflect differences in international trade elasticities. McCombie & Thirlwall (1994) consolidate this approach by demonstrating that growth is essentially demand-constrained by external demand conditions..

In the context of developing economies, Moreno-Brid (1999) analyzes Mexico over the period 1967–1994 using econometric models based on Thirlwall's Law, finding evidence that growth was constrained by the external restriction. Similarly, López and Cruz (2000) show, also for Mexico, that the structure of exports directly influences trade elasticities. For Latin America, Bértola et al. (2002), combining historical and econometric analysis, conclude that the external constraint constitutes a central determinant of growth trajectories.

At the structural level, the Dutch disease mechanism, formalized by Corden & Neary (1982), provides the theoretical basis for understanding how natural resource booms affect the productive structure. Subsequent empirical evidence suggests that real exchange rate appreciation and factor reallocation reduce the share of the manufacturing sector, undermining productive diversification and, consequently, export elasticity.

In this context, the empirical literature on natural resources provides relevant evidence. Sachs & Warner (2001), based on a cross-section of countries for the period 1970–1989 and using growth regressions, find a negative relationship between natural resource dependence and economic growth. This result is consistent with the hypothesis that commodity-specialized economies exhibit export structures with low income elasticity, thereby reinforcing the external constraint.

However, this relationship is not unidirectional. Alexeev & Conrad (2009), using cross-country regressions on a global sample, find no robust evidence that resource abundance reduces growth. Brunnschweiler & Bulte (2008), using panel data, show that resource abundance may be positively associated with growth when institutional quality is controlled for. These results indicate that the impact of Ricardian rents depends on the capacity to transform them into dynamic productive capabilities.

The importance of the productive structure is emphasized by Araujo & Lima (2007), who, using calibrated multisectoral models, demonstrate that changes in productive composition directly affect trade elasticities. In a complementary manner, Gouvêa and Lima (2010), using panel data, show that greater productive sophistication is associated with higher income elasticity of exports, reinforcing the link between economic complexity and the relaxation of the external constraint.

The exchange rate emerges as a central variable in this process. Rodrik (2008), using a panel of countries for the period 1950–2004 estimated with fixed effects, shows that competitive real exchange rates are positively associated with growth, especially in developing economies. Consistently, Razmi (2005) demonstrates that exchange rate misalignments undermine external performance by affecting the export structure.

In the African context, Collier & Goderis (2012), using a country panel for the period 1963–2003 with dynamic GMM, show that positive commodity price shocks increase growth in the short run but reduce growth in the long run. Andersen & Aslaksen (2012) provide evidence that more inclusive institutions mitigate these effects, while Mulwa & Mariara (2016) show that the impacts vary depending on the type of resource.

Macroeconomic stability also plays an important role. Aghion et al. (2009), using panel data, show that exchange rate volatility reduces productivity growth, especially in economies with underdeveloped financial markets. Aghion et al. (2016), using firm-level microdata from French firms for the period 1995–2007, demonstrate that exchange rate instability reduces innovation and export performance.

In the case of Mozambique, Adam and Simione (2013), using time-series analysis, show that positive terms-of-trade shocks lead to exchange rate appreciation and expansion of domestic demand, with adverse effects on the tradable sector. Benito-Spinetto and Moll (2015), analyzing large-scale mining megaprojects over the period 1990–2013, provide evidence of exchange rate appreciation pressures and weak productive linkages.

Thus, the empirical evidence indicates that the growth of resource-rich economies is conditioned by their ability to transform their productive structure and, consequently, their international trade elasticities. Thirlwall's Law shows that this transformation corresponds to a relaxation of the external constraint: economies that remain anchored in Ricardian rents tend to exhibit limited growth, whereas those that develop capabilities associated with Schumpeterian rents are able to sustain more robust long-term growth trajectories.

## 3. METHODOLOGICAL PROCEDURES

### 3.1 Empirical Strategy

This study investigates the external constraint on economic growth in Mozambique over the period 1980–2024, based on Thirlwall's Law. The empirical strategy is grounded in the estimation of the income elasticities of exports and imports, which are considered key determinants of growth consistent with balance-of-payments equilibrium.

Thirlwall's Law postulates that, in the long run, the growth of an open economy is constrained by its ability to generate foreign exchange through exports. In this sense, economic performance is intrinsically linked to external sector dynamics, particularly the income elasticities of international trade.

Economies specialized in primary goods, associated with Ricardian rents, tend to exhibit low income elasticity of exports and high income elasticity of imports, thereby reinforcing the external constraint on growth. By contrast, the transition toward a Schumpeterian rent regime implies a structural transformation in external trade elasticities. Productive diversification, technological upgrading, and increasing economic complexity tend to raise export elasticity and reduce import elasticity, making the external constraint less binding and allowing for more sustainable growth trajectories.

### 3.2Theoretical Framework of the Model

Thirlwall's Law is derived from a demand-led growth model in which balance-of-payments equilibrium acts as the main constraint on long-run economic growth. Recovering the export and import demand equations, we have:

$$m = \psi(p_f + e - p_d) + \pi \mathcal{Y} \quad (3.1)$$

$$x = \eta\,(p_d - p_f - e) + \varepsilon\, \mathcal{Z} \quad (3.2)$$

where $x$ and $m$ represent, respectively, the growth of exports and imports, $y$ the growth of domestic output, and $z$ the growth of world income. Imposing the external equilibrium condition ( $x = m$ ) and solving for the output growth rate yields the equation presented earlier.

$$\mathcal{Y} = \left(\frac{1+\eta+\psi}{\pi}\right)(p_d - p_f - e) + \left(\frac{\varepsilon}{\pi}\right) \mathcal{Z} \quad (3.3)$$

This result shows that the growth rate consistent with external equilibrium depends, among other factors, on the ratio between the income elasticities of exports and imports,

as well as on world income growth. Thus, the long-run performance of the economy is conditioned by structural factors related to its integration into international trade.

For the empirical estimation of these relationships, ARDL models are employed, which are suitable for analyzing both short- and long-run relationships among variables with different orders of integration, provided that none of them is integrated of order higher than one.

### 3.3 Model specification and control variables

The export and import functions are specified as follows:

$$ln\,X = \alpha_0 + \alpha_1 lnZ + \alpha_2 lnREER + \alpha_3 TOT + \alpha_4 lnTFP + \alpha_5 lnFDI + \varepsilon \quad (3.4)$$

$$ln\,M = \beta_0 + \beta_1 lnY + \beta_2 lnREER + +\beta_3 lnINV + \beta_4 plm + \mu \quad (3.5)$$

where: $X$denotes exports of goods and services; $M$ imports of goods and services; $Z$ world income; $Y$domestic gross domestic product (GDP); $REER$ the real effective exchange rate; $TOT$terms of trade; $TFP$ total factor productivity; $FDI$ foreign direct investment; $INV$ domestic investment (gross fixed capital formation); $P_{lm}$import prices; and $t$ the time dimension representing years. $\alpha_0$ and $\beta_0$are constant terms; $\alpha_i$ and $\beta_i$ are coefficients to be estimated; and $\varepsilon$ and $\mu$ are stochastic error terms.

The coefficients associated with income $(\alpha_1, \beta_1)$ represent, respectively, the income elasticities of exports and imports. These parameters are central to the analysis, as they are used to test the hypothesis that the predominance of Ricardian rents is associated with unfavorable external trade elasticities, as well as to assess whether there is evidence of a transition toward a regime based on Schumpeterian rents.

### 3.4 Estimation Procedures

For the empirical analysis, an ARDL modelling approach is adopted, which allows the simultaneous investigation of both short- and long-run relationships among variables, even when they exhibit different orders of integration, provided that none is integrated of order higher than one.

#### 3.4.1 Testes de Raiz Unitária

Initially, unit root tests are conducted to determine the order of integration and avoid spurious regressions. The Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) tests are used. ADF and PP assume a unit

root as the null hypothesis, while KPSS assumes stationarity. The ARDL approach requires variables to be I(0) or I(1), and cannot be applied if any series is I(2).

### 3.4.2 Cointegration Test

The existence of a long-run relationship among the variables is assessed through the bounds test proposed by Pesaran et al. (2001). The test is based on the estimation of an unrestricted ARDL model and on the joint significance of the coefficients of the level variables.

### 3.4.3 General Form of the ARDL Model

Once cointegration is confirmed, the ARDL model is estimated in its general form. For the export and import functions, we have:

$$ln\,X = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i}\, ln\, X_{t-i} + \sum_{i=1}^{q} \alpha_{2i}\, ln\, Z_{t-i} + \sum_{i=1}^{r} \alpha_{3i}\, ln\, R\,EER_{t-i} +$$

$$\sum_{i=1}^{s} \alpha_{4i}\, ln\, T\,OT_{t-i} + \sum_{i=1}^{u} \alpha_{5i} \ln TFP_{t-i} + \sum_{i=1}^{v} \alpha_{6i}\, ln\, F\,DI_{t-i} + \varepsilon_t \quad (3.6)$$

$$ln\,M = \beta_0 + + \sum_{i=1}^{p} \beta_{1i}\, ln\, M_{t-i} + \sum_{i=1}^{q} \beta_{2i}\, ln\, Y_{t-i} + \sum_{i=1}^{r} \beta_{3i}\, ln\, R\,EER_{t-i} +$$

$$\sum_{i=1}^{s} \beta_{4i} lnInv_{t-i} + \sum_{i=1}^{u} \beta_{5i} lnplm_{t-i} + \mu_t \quad (3.7)$$

where $p, q, r, s, u,$and $v$ represent the lag orders selected based on information criteria (AIC).

### 3.4.4 Error Correction Mechanism (ECM)

The short-run dynamics and the adjustment toward long-run equilibrium are captured through the error correction mechanism (ECM) representation. For exports and imports, we have:

$$\Delta \ln X = \delta_0 + \sum_{i=1}^{p-1} \delta_{1i} \ln X_{t-i} + \sum_{i=1}^{q-1} \delta_{2i} \ln Z_{t-i} + \sum_{i=1}^{r-1} \delta_{3i} \ln REER_{t-i} + \sum_{i=1}^{s-1} \delta_{4i} \ln TOT_{t-i} + \sum_{i=1}^{t-1} \delta_{5i} \ln TFP_{t-i} + \sum_{i=1}^{u-1} \delta_{6i} \ln FDI_{t-i} + \lambda ECM_{t-1} + \varepsilon_t \quad (3.8)$$

$$\ln M = \phi_0 + \sum_{i=1}^{p-1} \phi_{1i} \ln M_{t-i} + \sum_{i=1}^{q-1} \phi_{2i} \ln Y_{t-i} + \sum_{i=1}^{r-1} \phi_{3i} \ln REER_{t-i} + \sum_{i=1}^{s-1} \phi_{4i} \ln INV_{t-i} + \sum_{i=1}^{u-1} \phi_{6i} \ln Hplm_{t-i} + \vartheta ECM_{t-1} + \mu_t \quad (3.9)$$

The term $ECM_{t-1}$ represents the deviation from long-run equilibrium in the previous period. The coefficients $\lambda$ and $\vartheta$ are expected to be negative and statistically significant, indicating that any deviations are corrected over time.

### 3.5 Data

Table 1 presents the description of the variables used in the empirical models, including their definitions, proxies, and respective data sources. The series are annual and cover the period from 1990 to 2024, allowing for the analysis of the long-run dynamics of the Mozambique economy in light of Thirlwall's Law.

Table 1 – Description of variables and data sources

| Variables | Symbols | Description | Source |
|---|---|---|---|
| Exports | X | Value of exports of goods and services | World Bank (WDI)) |
| Imports | M | Value of imports of goods and services | World Bank (WDI) |
| Gross Domestic Product | Y | Domestic income (GDP) | World Bank (WDI) |

| | | | |
|---|---|---|---|
| Foreign income3 | Z | Weighted average of the GDP of main trading partners (trade weights) | International Monetary Fund (IFS) / World Bank |
| Real Effective Exchange Rate4 | REER | External competitiveness | International Monetary Fund (IFS) / World Bank |
| Termos de Troca | TOT | Terms of trade (ratio between export and import prices) | World Bank |
| Produtividade | TFP | Productive efficiency of the economy (Total Factor Productivity, TFP) | Penn World Table |
| Investimento Direto Estrangeiro | FDI | Foreign productive capital inflows (FDI) | World Bank |
| Investimento Doméstico | INV | Gross Fixed Capital Formation | World Bank |
| preços das importações | plm | Import prices | Penn World Table |

**Source:** Authors' own elaboration based on the World Bank, International Monetary Fund, and Penn World Table.

**Note:** All monetary variables were converted into real terms and transformed into natural logarithms. The empirical analysis covers the period 1990–2024. In addition, potential structural breaks associated with the post-civil war period and the beginning of natural gas exploration in Mozambique were taken into account.

## 4. RESULTS

### 4.1 Stationarity Tests

To verify the stochastic properties of the series and avoid spurious regressions, unit root tests were conducted, namely ADF, PP, DF-GLS, and KPSS. In the ADF, PP, and DF-GLS tests, the null hypothesis assumes the presence of a unit root, whereas KPSS assumes

[3] Foreign income was calculated as $Y^* = \sum_{i=1}^{n} w_i Y_i$, where $w_i$ represents the weight of trading partner in total trade, and $Y_i$ denotes its Gross Domestic Product (GDP).

[4] The real effective exchange rate (REER) is calculated as a weighted average of bilateral exchange rates adjusted for price differentials, given by $REER = \prod_{i=1}^{n} \left(E_i \frac{p}{p_i}\right)^{w_i}$, where $E_i$ represents the nominal exchange rate with trading partner $i$, $P$ is the domestic price level, $P_i$ is the price level of partner $i$, and $w_i$ are the trade weights.

stationarity under the null. Additionally, the ADF test with structural break was employed allowing for possible breaks in the level or trend of the series. The results are summarized in Tables 2 and 3 below.

**Table 2.** Results of the Stationarity Tests for Variables in Levels (ADF, PP, DF-GLS, KPSS, and ADF with Structural Break)

| Variable | Test | | | | | Results |
|---|---|---|---|---|---|---|
| | ADF | PP | DF-GLS | KPSS | ADF (Structural Brea | |
| | p-value | | Test Statistic (τ) | | p-value | |
| lnfdi | 0,4283 | -1,005 | 0,3105 | 0,5736 | 0,4618 | Unit Root |
| lnreer | 0,0029 | 0,0015 | -1,7762 | 0,1575 | 0,0100 | Stationary |
| lninv | 0,2387 | 0,1186 | -2,3867 | 0,1174 | 0,7170 | Stationary |
| lnimports | 0,8566 | 0,8916 | -0,2578 | 0,6509 | 0,7101 | Stationary |
| lnexports | 0,8837 | 0,8877 | -0,1882 | 0,6478 | 0,4313 | Stationary |
| lngdp | 0,7632 | 0,7288 | -0,6310 | 0,5779 | 0,7944 | Stationary |
| lntot | 0,9996 | 1,000 | -0,2918 | 0,3996 | 0,9900 | Stationary |
| lntpf | 0,1135 | 0,3692 | -1,4139 | 0,4587 | 0,0208 | Stationary |
| plm | 0,8658 | 0,8658 | -0,6768 | 0,3168 | 0,0100 | Stationary |

**Source:** Authors' own elaboration based on EViews 13 outputs.

**Notes:** ADF, PP, and DF-GLS refer to the t-statistics, whereas KPSS corresponds to the LM statistic. The null hypothesis of the ADF, PP, and DF-GLS tests is the presence of a unit root, while in the KPSS test the null hypothesis is stationarity. The symbols *, **, and *** indicate rejection of the null hypothesis at the 10%, 5%, and 1% significance levels, respectively. The critical values for the KPSS LM statistic are 0.347 (10%), 0.463 (5%), and 0.739 (1%). For the DF-GLS test, the critical values are −1.6104 (10%), −1.9521 (5%), and −2.6417 (1%).

**Table 3.** Results of the Stationarity Tests for Variables in First Differences (ADF, PP, DF-GLS, and KPSS)

| Variaveis | Test | | | | | Result |
|---|---|---|---|---|---|---|
| | ADF | PP | DF-GLS | KPSS | ADF (Quebra) | |
| | p-value | | Estatística (τ) | | p-value | |
| lnfdi | 0,0000 | 0,0000 | -1,4910 | 0,1378 | 0,0100 | Stationary |
| lninv | 0,0000 | 0,0000 | -2,3969 | 0,1161 | 0,0100 | Stationary |
| lnimports | 0,0000 | 0,0000 | -4,9600 | 0,1232 | 0,0100 | Stationary |
| lnexports | 0,0000 | 0,0000 | -2,9978 | 0,1179 | 0,0100 | Stationary |
| lngdp | 0,0004 | 0,0000 | -5,0277 | 0,0701 | 0,0100 | Stationary |
| lntot | 0,9983 | 0,0000 | -0,9866 | 0,3458 | 0,9900 | Stationary |
| lntpf | 0,0446 | 0,00 | -2,6426 | 0,4327 | 0,0634 | Stationary |
| plm | 0,0000 | 0,0000 | -5,2938 | 0.2375 | 0,0100 | Stationary |

**Source:** Authors' own elaboration based on EViews 13 outputs.

**Notes:** ADF, PP, and DF-GLS refer to the t-statistics, whereas KPSS corresponds to the LM statistic. The null hypothesis of the ADF, PP, and DF-GLS tests is the presence of a unit root, while in the KPSS test the null hypothesis is stationarity. The symbols *, **, and *** indicate rejection of the null hypothesis at the 10%, 5%, and 1% significance levels, respectively. The critical values for the KPSS LM statistic are 0.347

(10%), 0.463 (5%), and 0.739 (1%). For the DF-GLS test, the critical values are −1.6104 (10%), −1.9521 (5%), and −2.6417 (1%).

The results of the unit root tests, reported in Tables 2 and 3, reveal that most variables are non-stationary in levels but become stationary after first differencing, suggesting integration of order one, I(1). By contrast, the real effective exchange rate exhibits stationarity in levels and is therefore classified as I(0). This combination of integration orders supports the application of the ARDL approach, which accommodates variables integrated of order I(0) and I(1), provided that none is integrated beyond the first order, as established by Pesaran et al. (2001).

### 4.2 Specification of the ARDL Models and Lag Selection Criterion

Lag selection was based on the Akaike Information Criterion (AIC), resulting in the ARDL(1,3,1,2,1,1) specification for exports and ARDL(3,1,1,2,0) for imports, as presented in Table 4.

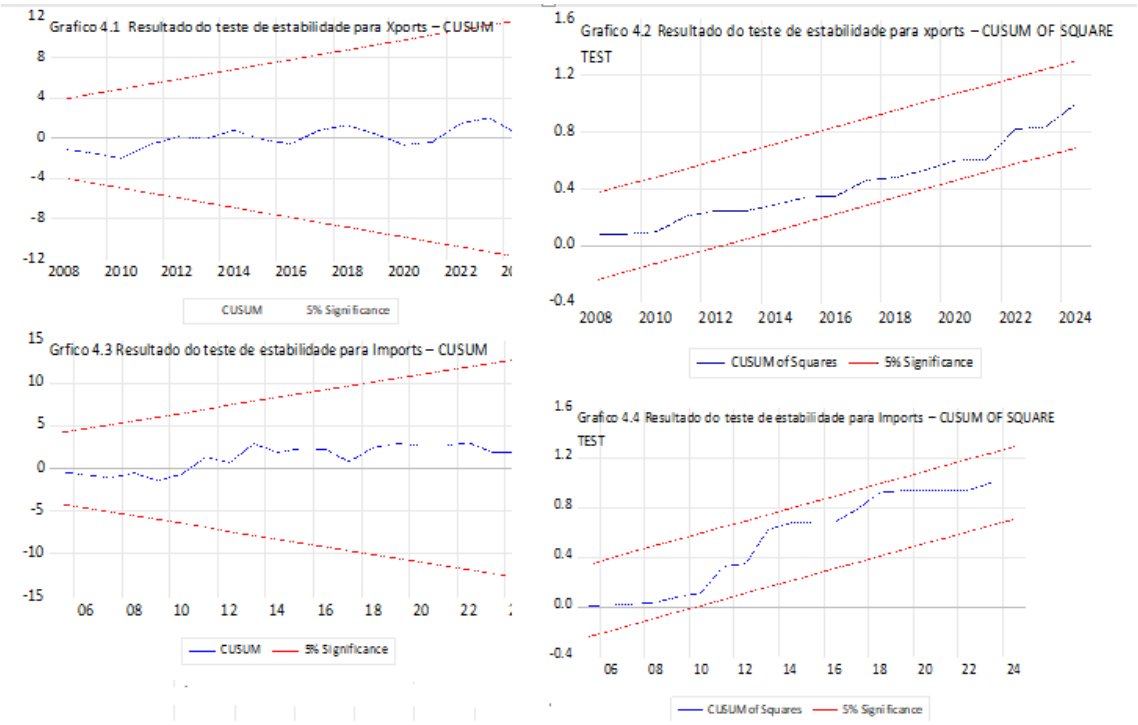
Thereafter, serial correlation tests were conducted to assess the adequacy of the estimated models through the Breusch–Godfrey LM test. The results indicate that the null hypothesis of no serial correlation cannot be rejected at the 5% significance level, since the p-values associated with the F-statistics are greater than 0.05 in both models. This suggests the absence of serial correlation in the residuals and supports the adequacy of the estimated specifications under this criterion.

**Table 4.** Specification of the ARDL Models and Lag Selection Criterion

| Model | Dependent Variable | ARDL Structure | Explanatory Variables | Selection Method | Serial Correlation Test |
|---|---|---|---|---|---|
| Exports | LNXPORTS | ARDL(1,3,1,2,1,1) | lnxports lnz lnreer lntpf lnfdi lntot | AIC | 0,1143 |
| Imports | LNIMPORTS | ARDL(3,1,1,2,0) | lnimports lngdp lnreer lninv plm | AIC | 0,42094 |

**Source:** Authors' own elaboration based on EViews 13 outputs.

Additionally, parameter stability was assessed using the CUSUM and CUSUMSQ tests, which examine the evolution of recursive residuals over time. The results confirm the stability of the estimated parameters, as the cumulative statistics remain within the 5% critical bounds. This indicates the absence of structural instability and reinforces the robustness of the adopted specifications.




**Source:** Authors' own elaboration based on EViews 13 outputs

### 4.3 Cointegration Test

To verify the existence of a long-run relationship among the variables analyzed, the bounds test was applied within the ARDL framework. This test allows the assessment of cointegration regardless of whether the variables are integrated of order I(0) or I(1), provided that none is integrated of a higher order. The results are presented in Table 5 below..

**Table 5. Results of the Cointegration Tests**

| Model | F-Stat | I(0) Bound | | | I(1) Bound | | | **Cointegration** |
|---|---|---|---|---|---|---|---|---|
| | | 10% | 5% | 1% | 10% | 5% | 1% | |
| Xpots | 5.7159 | 2.407 | 2.910 | 4.134 | 3.517 | 4.193 | 5761 | Yes |
| imports | 4.6798 | 2.525 | 3.058 | 4.280 | 3.560 | 4.223 | 5.840 | Yes |

**Source**: Authors' own elaboration based on EViews 13 outputs

The values of the F-statistic are compared with the critical bounds proposed by Pesaran et al. (2001), allowing inference regarding the existence of cointegration among the variables. As observed, the estimated F-statistics for the export and import models exceed the upper critical bounds at the 5% significance level, indicating rejection of the null

hypothesis of no cointegration. Therefore, it can be concluded that a long-run equilibrium relationship exists among the variables in both models.

### 4.4 Long-Run Coefficient Estimates

Once the existence of cointegration among the variables was confirmed, the long-run coefficients were estimated using the ARDL approach. Table 6 below presents the results obtained for the export and import models. In the context of this study, particular attention is given to the coefficient associated with domestic income (lngdp) in the imports model and the coefficient associated with world income (lnZ) in the export model, as these represent the income elasticities of imports and exports, respectively. These elasticities are central to the application of Thirlwall's Law, since they determine the external constraint on long-run economic growth.

**Table 6**. Long-Run Coefficient Estimates – ARDL Model

| Modelo ARDL<br>Variaveis | Exports<br>ARDL(3,3,1,1,0,1) | Imports<br>ARDL(3,1,1,2,0) |
|---|---|---|
| LnY | | 2.3369 (0,0307)*** |
| Lnreer | -0.8395(0.001)*** | -5.2803(0.2962) |
| Lninv | | -1.2512(0.5890) |
| lnZ | 2.1119 (0.000)*** | |
| lnTOT | 5.0413(0.000)*** | |
| lnTFP | 12.1835(0.000)*** | |
| lnfdi | -0.2425(0.0282)*** | |
| plm | | -4.9622(0.2320) |

**Source:** Authors' own elaboration based on EViews 13 outputs.

The long-run ARDL estimates indicate that exports are predominantly driven by external and structural factors, whereas imports respond mainly to domestic income dynamics. The positive and statistically significant effect of world income on exports directly supports Thirlwall's Law, confirming that export growth is constrained by external demand (Thirlwall, 1979). The real effective exchange rate exhibits a negative and significant coefficient in the export equation, suggesting that exchange-rate appreciations undermine external competitiveness. This finding is consistent with the competitive exchange-rate literature (Rodrik, 2008; Frenkel & Rapetti, 2011) and with the Dutch disease framework (Corden & Neary, 1982), whereby resource-driven appreciations weaken tradable-sector performance.

The positive effects of terms of trade and total factor productivity suggest that efficiency gains and structural upgrading enhance export capacity, in line with the literature on economic complexity and structural transformation (Hausmann et al., 2014; Hidalgo, 2021). By contrast, the negative effect of foreign direct investment reflects a pattern typical of resource-dependent economies, in which foreign capital is concentrated in extractive activities characterized by weak productive linkages, reinforcing the resource curse hypothesis (Sachs & Warner, 2001; Arezki et al., 2017).

In the import equation, domestic income displays a positive and statistically significant coefficient, confirming the high income elasticity of imports and highlighting the balance-of-payments constraint as the main limitation on long-run growth. This result accords with the Thirlwallian framework, according to which growth is constrained by the capacity to finance imports (McCombie, 1989; Moreno-Brid, 1999). The absence of exchange-rate significance suggests low price elasticity of imports, reflecting structural dependence on imported goods, particularly those with higher technological content.

Taken together, the findings reveal a growth pattern characterized by the predominance of Ricardian rents: exports remain dependent on external conditions and a weakly diversified productive structure, while imports are strongly tied to domestic expansion. This configuration generates low income elasticity of exports and high income elasticity of imports, resulting in an unfavorable $\varepsilon/\pi$ ratio and a persistent external constraint on growth. The evidence therefore indicates limited progress toward a Schumpeterian rent regime capable of sustaining long-run growth without generating external imbalances.

The ARDL estimations also demonstrate strong statistical performance. The export and import models exhibit high explanatory power, with $R^2$ values above 0.98, highly significant F-statistics, and Durbin–Watson statistics close to two, indicating the absence of serious autocorrelation problems. Overall, the results provide robust empirical support for the central role of productive structure and external constraints in shaping long-run growth dynamics.

**4.5 Short-Run Shocks**

Table 7 below presents the estimated results of the ARDL model in terms of short-run dynamics for exports and imports. It reports the coefficients of the variables in first differences, including their respective lags, as well as the error correction term (ECM), allowing for the simultaneous analysis of immediate adjustment effects and the speed of

convergence toward long-run equilibrium. The results highlight the relevance of transitory shocks in the main explanatory variables and the existence of a consistent adjustment mechanism in both models.

**Table 7. Short-Run Shocks of the ARDL Models for Exports and Imports – Error Correction and Significant Variables**

| Modelo | xports | Imports |
|---|---|---|
| ARDL<br>Variaveis | ARDL(3,3,1,1,0,1) | ARDL(3,1,1,2,0) |
| D(lnZ) | -0.0570(0.7295) | |
| D(lnZ(-1)) | -1.6402(0.0000) | |
| D(lnZ(-2)) | -0.6671(0.0116) | |
| D(lnimports(-1)) | | -0.2956 (0.0081) |
| D(lnimports(-2)) | | -0.3241 (0.0051) |
| D(lnY) | | 1.3086 (0.6339) |
| D(lnreer) | -0.4607 (0.0000) | 0.0451 (0.0001) |
| D(lntfp) | 6.7451 (0.0052) | |
| D(lntfp(-1)) | -4.4070(0.0398) | |
| D(lnfdi) | 0.0058(0.9277) | |
| D(lntot) | 2.2284(0.0057) | |
| D(lninv) | | -0.0354(0.7494) |
| D(lninv(-1)) | | 0.4985 (0.0002) |
| ECM (-1) | -1.0231(0.0000) | -0.0974 (0.0000) |

**Source:** Authors' own elaboration based on EViews 13 outputs.

The short-run dynamics from the ARDL models reveal distinct behaviors between exports and imports, reflecting important asymmetries in the external adjustment process. In the export model, shocks to world income (ΔlnZ) exhibit negative and statistically significant lagged effects, suggesting that the response of external demand is not immediate but occurs with adjustment over time.

The real effective exchange rate (ΔlnREER) shows a negative and highly significant impact, indicating that exchange rate appreciations rapidly reduce external competitiveness, consistent with the literature on exchange rates and export performance (Rodrik, 2008; Frenkel & Rapetti, 2011). In turn, total factor productivity (ΔlnTFP) and terms of trade (ΔlnTOT) exhibit positive and significant effects, suggesting that structural improvements and efficiency gains have an immediate influence on export dynamics, reinforcing the importance of productive transformation in the short run.

In the import model, domestic income is not statistically significant in the contemporaneous period, while lagged imports display negative and significant coefficients, indicating strong dynamic persistence and gradual adjustment. The real

effective exchange rate shows a positive and significant coefficient, suggesting that exchange rate depreciations reduce import demand in the short run, indicating some sensitivity to relative prices, although this effect appears limited in the long run. Investment exhibits mixed effects, reflecting its dual role as a driver of productive capacity and as a source of demand for imported capital goods.

In both models, the error correction term (ECM) is negative and highly significant, confirming the existence of a long-run equilibrium relationship among the variables. In the export model (−1.0231), the coefficient suggests a rapid adjustment process, possibly involving overshooting, whereas in the import model (−0.0974) convergence is much slower, indicating greater rigidity in the adjustment of the import sector. This difference is consistent with structuralist literature, which highlights higher inertia in imports due to dependence on intermediate inputs and capital goods.

### 4.6 Diagnostic Tests

Table 8 below presents the results of the diagnostic tests applied to the estimated models. The specification test (Ramsey RESET), residual normality test (Jarque-Bera), and heteroskedasticity test (Breusch-Pagan-Godfrey) generally indicate that the null hypotheses cannot be rejected, suggesting no evidence of functional form misspecification, non-normal residuals, or heteroskedasticity. These results reinforce the econometric adequacy of the estimated models and the robustness of the inferences drawn.

**Table 8.** Results of Diagnostic Tests

| Problem | Applied Test | Statistics (p-value) Models | |
|---|---|---|---|
| | | Exports | Imports |
| Specification | Ramsey (RESET) | 0.9706 | 0.3642 |
| Normality | Jarque-Bera | 0.7927 | 0.5663 |
| Heteroskedasticity | Breusch-Pagan-Godfrey | 0.4785 | 0.9343 |

**Source:** Authors' own elaboration based on EViews 13 outputs.

### 4.7 Empirical Evidence of Thirlwall's Law

Using the estimated long-run coefficients obtained from the ARDL models, an empirical test of Thirlwall's Law is conducted, which posits that long-run economic growth is constrained by the balance-of-payments equilibrium. Within this framework, the

sustainable growth rate is determined by the ratio between the income elasticity of exports and the income elasticity of imports, multiplied by the growth rate of world income.

World income is approximated by the weighted average growth rate of the main trading partners of Mozambique, reflecting the country's effective external trade structure. This approach allows for a more realistic representation of external demand dynamics relevant to Mozambican exports, as it incorporates the relative importance of each partner in total bilateral trade. The theoretical formulation is given by:

$$g_{BOP} = \frac{\varepsilon}{\pi} z \tag{4.1}$$

where $\varepsilon$ represents the income elasticity of exports, $\pi$ the income elasticity of imports, and $z$ the growth rate of world income.

### 4.7.1 Income Elasticities and the Balance-of-Payments-Constrained Growth Rate

The elasticities were obtained from the long-run estimates of the ARDL model, with the income elasticity of exports $\varepsilon = 2.1119$ and the income elasticity of imports $\pi = 2.3369$. Thus, the ratio between the elasticities is given by:

$$\frac{\varepsilon}{\pi} = \frac{2.1119}{2.3369} = 0.9039 \tag{4.2}$$

Under this configuration, the balance-of-payments-compatible growth rate amounts to approximately 90.39% of the world income growth rate. Substituting the average growth rate of world income, we obtain:

$$g_{BOP} = 0{,}9039.z \tag{4.3}$$

### 4.7.2 World income growth rate (z)

World income growth is proxied by the weighted average growth rate of the main trading partners of Mozambique, in order to reflect the country's effective external trade structure. This approach captures the differentiated influence of each partner in determining the external demand relevant to Mozambican exports.

The main trading partners considered in the calculation were: South Africa, the Netherlands, India, China, the United Arab Emirates, Portugal, Singapore, South Korea, the United Kingdom, the United States of America, Japan, Italy, Zimbabwe, Spain, France, and Thailand. Formally, world income was defined as:

$$z = \sum_{i=1}^{16} w_i g_i \tag{4.3}$$

where $w_i$represents the trade weight of partner $i$in total trade (exports + imports) of Mozambique, and $g_i$denotes the real GDP growth rate of the respective partner country. The estimated value for the period is:

$$z = 2{,}6092\%$$

Substituting the average world income growth rate, $z = 2.6092$, yields a balance-of-payments-compatible growth rate given by:

$$g_{BOP} = 0.9039x2{,}6092\% = 2.359\%$$

This result suggests that the economy of Mozambique exhibits a sustainable growth rate below the average income dynamics of its main trading partners, highlighting the presence of an external constraint on growth.

Within this context, the fact that the ratio between the elasticities is below unity suggests that import growth responds more strongly than export expansion capacity, thereby constraining long-run growth potential. This result is consistent with the demand-led growth approach, according to which the economic performance of open economies is conditioned by the structure of international trade and the income elasticities of trade. The average real GDP growth rate of Mozambique over the sample period is:

$$g_{real} = 6{,}045\%$$

a value substantially higher than the external-sector-consistent growth rate (2.359%). This divergence suggests that, over the period under analysis, the economy grew above the limit imposed by the structural external constraint.

This deviation may be explained by external financing mechanisms such as capital inflows, external borrowing, or the use of international reserves, which can temporarily sustain growth above the external constraint. However, the gap between actual and balance-of-payments-compatible growth indicates that economic performance is not fully supported by external conditions, suggesting long-run external vulnerabilities.

Overall, the results provide consistent empirical evidence that long-run economic growth is constrained by the external sector, although this adjustment may be partially mitigated in the short and medium term by international financing flows.

### 4.7.3 Empirical Evidence of the External Constraint on Economic Growth

For purposes of synthesis and comparison of the main findings obtained from the empirical assessment of Thirlwall's Law, Table 9 presents a summary of the actual output growth rate, the balance-of-payments-consistent growth rate, and the weighted world income growth rate of the main trading partners of Mozambique.

**Table 9.** Empirical Evidence of the External Constraint on Economic Growth

| Indicator | Growth Rate |
|---|---|

| | |
|---|---|
| Real growth ($g_{real}$) | 6.045% |
| BOP-consistent growth ($g_{BOP}$) | 2.359% |
| World growth ($z$) | 2.609% |

**Source:** Authors' own elaboration, based on research results.

Table 9 above provides robust evidence of the presence of an external constraint on economic growth in Mozambique. It shows that the actual growth rate of the economy (6.045%) significantly exceeds the externally sustainable growth rate (2.359%), estimated based on Thirlwall's Law. This gap indicates that observed growth is not sustainable in the long run without generating external imbalances.

In the case of Mozambique, this growth above the external constraint has been largely enabled by external borrowing. Debt accumulation allows the financing of current account deficits and the maintenance of absorption levels above the economy's foreign-exchange-generating capacity. However, this mechanism entails the build-up of external vulnerabilities, as it increases exposure to international liquidity shocks, exchange rate pressures, and debt sustainability risks.

Additionally, the world income growth rate (2.609%) exceeds the balance-of-payments-consistent growth rate but remains substantially lower than actual economic growth. This finding reinforces the evidence that Mozambique operates above its external constraint. In line with Thirlwall's Law, this result suggests an unfavorable ratio between the income elasticities of exports and imports ($\varepsilon/\pi$), reflecting structural limitations in the economy's capacity to generate foreign exchange.

This pattern is consistent with the structuralist literature on resource-based economies, in which the predominance of Ricardian rents is associated with low income elasticity of exports and high dependence on imports (Thirlwall, 1979; McCombie, 1989). As widely discussed, this productive structure implies that domestic income expansion generates increasing pressure on the external sector, often financed through external borrowing.

In the specific context of Mozambique, recent episodes of external debt accumulation, including the sharp increase in public indebtedness during the 2010s, illustrate how growth can be temporarily sustained through external financial inflows, albeit at the cost of greater macroeconomic fragility. This pattern reinforces the non-sustainable nature of growth trajectories that are disconnected from the economy's structural capacity to generate foreign exchange.

Thus, the empirical results corroborate the hypothesis that economic growth is constrained by the external sector. It is therefore essential to promote a process of structural transformation associated with a shift from Ricardian to Schumpeterian rents, with a view to increasing the income elasticity of exports, reducing import dependence, and mitigating the recurrent reliance on external borrowing as a mechanism for sustaining growth.

## 5. CONCLUDING REMARKS

The empirical investigation examined the validity of Thirlwall's Law for the economy of Mozambique, employing the ARDL approach to estimate the income elasticities of exports and imports and, subsequently, to assess the external constraint on long-run economic growth. The identification of a cointegration relationship among the variables ensures the consistency of the estimated parameters, providing empirical support for the demand-led growth theoretical framework.

The results indicate an unfavorable structural configuration, insofar as the income elasticity of exports is lower than that of imports, implying an elasticity ratio ($\varepsilon/\pi$) of 0.9039. Based on this relationship and world income growth, an external constraint-consistent growth rate of 2.359% was estimated, which is substantially lower than the observed average growth rate of 6.045%. This discrepancy provides evidence that the recent growth trajectory of Mozambique has systematically operated above the limit imposed by the external constraint.

Rather than constituting a refutation of Thirlwall's Law, this deviation should be interpreted as an expression of intertemporal relaxation mechanisms of the external constraint, made possible primarily through access to external financing. In the case of Mozambique, this process has materialized through the intensification of public and external indebtedness, which allows the maintenance of absorption levels above the domestic capacity to generate foreign exchange. However, such a strategy reflects an inherently fragile growth pattern, insofar as it shifts the external constraint from flows to stocks, transforming current account deficits into rising external liabilities.

This dynamic implies an increase in macroeconomic vulnerabilities, reflected in greater sensitivity to reversals in capital flows, worsening external financing conditions, and recurrent pressures on the exchange rate. Moreover, in the absence of structural transformations that increase the income elasticity of exports, debt-driven expansion

tends to reproduce, and potentially deepen, the very external constraint it seeks to alleviate.

In this sense, the empirical results provide a qualified validation of Thirlwall's Law: the external sector operates as an effective constraint on long-run growth, albeit temporarily mitigated through external financing mechanisms. However, such mitigation comes at the cost of accumulating imbalances that undermine the intertemporal sustainability of the growth trajectory.

From a policy perspective, the results reinforce the centrality of a structural transformation agenda aimed at altering the pattern of productive specialization. Specifically, increasing the income elasticity of exports through diversification, upgrading, and greater technological content, alongside reducing the income elasticity of imports, constitutes a necessary condition for a sustainable relaxation of the external constraint. In parallel, prudent external debt management is required to prevent growth financing from becoming a source of macroeconomic instability.

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