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China's Resource-Backed Debt Model for Africa: The Cases of DRC, Kenya, and Zimbabwe

Emiliano Finocchi, Flavio Finocchi

LUISS Business School, Università LUISS Guido Carli, Rome, Italy
Email: efinocchi@luiss.it

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Abstract

This research provides an in-depth analysis of China's economic engagements in Africa, focusing on the interplay between sovereign debt acquisition and subsequent export patterns in the Democratic Republic of Congo, Kenya, and Zimbabwe from 2009 to 2021. Introducing the "Resource-Backed Debt Model" conceptual model, the study elucidates China's strategic maneuvering to secure pivotal natural resources in Africa by leveraging sovereign debts. Empirical evaluations reveal a significant positive correlation between China's acquired debt and the export volumes from the selected African nations, manifesting predominantly after a latency of six years. This correlation substantiates the hypothesis that China systematically assimilates sovereign debts to ensure sustained access to invaluable resources. The paper delves into the multifaceted repercussions of China's predominant debt ownership on the economic stability, political sovereignty, and strategic autonomy of the debtor nations, underscoring the potential emergence of economic dependencies and geopolitical vulnerabilities. Despite inherent limitations, including data accessibility challenges, this research contributes nuanced insights to the discourse on Sino-African economic relations, offering a comprehensive understanding of the underlying dynamics and global implications. The study concludes by advocating for expansive research to further unravel the intricate interdependencies between China and Africa and the impact of their strategy on the international, economic and geopolitical equilibrium.

Keywords

China-Africa Relations, Sovereign Debt, Natural Resources, Economic Dependence, Resource-Backed Debt Model, Financial Engagements, Export Correlation

1. Introduction

"Globalization presents a plethora of growth prospects and opportunities" (Ghemawat, 2010: p. 149). Within the dynamic realm of global business and ethical considerations, the pursuit to establish a universally accepted regulatory entity unfolds as a complex challenge (Brenkert, 2018). The International Monetary Fund (IMF) stands as a crucial institution in this context, wielding both direct and indirect influence to uphold equitable practices. Its core values are to "support economic policies that promote financial stability and monetary cooperation, which are essential to increase productivity, job creation, and economic well-being. The IMF has three critical missions: furthering international monetary cooperation, encouraging the expansion of trade and economic growth, and discouraging policies that would harm prosperity" (IMF Website, n.d.). The question then emerges: Is the IMF Efficient in their methodology in fostering a secure and competitive environment for corporate globalization? The prevailing evidence seems to contradict this statement, as companies exhibiting aggressive behavior are inclined to undertake competitive actions that disrupt market stability, whereas those adopting a passive approach are likely to maintain the existing market equilibrium (Haddad, Huebner, & Loualiche, 2021). In this regard, China distinguishes itself as a dynamic player in the global market, leveraging an assertive approach that fosters international success. As highlighted by Huang, Shen, and Zhang (2020), the proactive support of the Chinese government significantly propelled overseas performance of its state-owned enterprises, demonstrating a strategic commitment to strengthening China's global economic influence and competitiveness.

This paper introduces a conceptual model employed by the Chinese government to expand trade with Africa by leveraging national debt and analyzes its implications with IMF regulations. This is achieved through the adoption of diverse regulatory frameworks that may not be considered by other entities, leading to distinct outcomes that will be systematically analyzed in this study. To validate this model, the paper will start by scrutinizing sovereign debts and exports from 2009 to 2021 of three countries: the Democratic Republic of the Congo (DRC), Kenya, and Zimbabwe (Supporting Annex, **Figure A1**). In selecting these countries for detailed investigation in this study, we aim to capture a representative cross-section of Sub-Saharan Africa's export dynamics, while also managing the scope and resources of our research effectively. The choice of these countries ranked 4th, 12th, and 21st respectively in terms of general export value (World Bank Group, n.d.), allows us to explore a diverse array of economic contexts, from the high-volume mineral exports of the DRC to the more modest but strategic exports of Zimbabwe. This approach avoids the extreme skew seen with South Africa's disproportionately large export volumes, which could obscure broader regional trends. Furthermore, focusing on these countries allows for a manageable yet comprehensive analysis, avoiding the lower-value export profiles of countries ranked beyond the 26th place, which may not provide sufficient economic impact or variability for meaningful comparative analysis. This strategic selection ensures that the study remains focused on economically significant interactions that are

representative of the region's activities in the global trade environment.

The objectives of this paper are threefold: firstly, to analyze the strategies propelling China's success in emerging markets, plausibly utilizing the IMF's Debt Sustainability Framework (DSF) as a lever to secure a consistent supply of natural resources; secondly, to empower practitioners and policymakers with the insight to discern a "Resource-Backed Debt Model", that is, to identify and engage with it in a responsible and informed way. This research is distinctive as it provides insights into three significant African countries, offering an analysis of the Resource-Backed Debt Model in emerging markets and examining China's approach to local regulatory frameworks within its broader economic engagements.

2. Conceptual Background

2.1. China's Need for Natural Resources

Haynes and Hillman (2010) invoke Carpenter in positing that variations in the foundational patterns of present and prospective resource allocations are perceived by several scholars as pivotal determinants of competitive advantage and organizational longevity. Here, the term "resources", as utilized by Haynes and Hillman, denotes the capability of the board of directors to allocate assets to the organization. In alignment with this rationale, the Chinese government endeavors to formulate a long-term strategy for the procurement of natural resources to fortify China's competitive advantage and ensure organizational longevity (Huang, Shen, & Zhang, 2020). Given its substantial economic growth rate of 4.5% between 2019 and 2022 (World Bank Group, n.d.) and its population surpassing 1.4 billion in 2022 (World Bank Group, n.d.), China is confronted with an acute necessity for new natural resources. As the world's second-largest economy, China capitalizes on its considerable financial liquidity to negotiate for invaluable commodities with countries endowed with them. This negotiation process is predominantly facilitated by the Chinese Export Credit Agency (C-Exim) and the China Development Bank (CDB) (Chen, 2020; Guan et al., 2020; Guillon & Mathonnat, 2020; Kärkkäinen, 2016). For instance, Kärkkäinen (2016) asserts that entities like China's Ministry of Commerce, C-Exim, and CDB have exerted substantial pressure on the Zimbabwean government to proffer resources as collateral for additional Chinese loans (as IMF's debt limit was achieved by the country), especially during the mid-2000s. This exemplifies the instrumental role of these entities in aligning China's strategies to secure natural resources with its broader geoeconomics strategies. Moreover, China C-Exim's collaboration with Angola since 2004 is noteworthy, where the host government's proficiency in leveraging oil exports for international finance culminated in the inception of a loan-for-oil scheme, delineating the complex dynamics of resource-backed financial interactions between China and resource-rich developing nations (Chen, 2015).

2.2. Resource-Backed Debt Model Mechanism

Gallagher (2011) contends that the Chinese engagement with Africa is driven by

a seemingly insatiable demand for raw materials and new markets, supported by a unified and potent Chinese state that delineates and directs policy. The Chinese pursuits are predominantly cantered around material self-interest, as extensive literature elucidates the strategies employed by China to gain access to African natural resources (Alves, 2013; Feng et al., 2015; Gunessee & Hu, 2020; Tan-Mullins & Mohan, 2013), there is a conspicuous absence of research linking such strategies to interactions with the IMF and the correlation between sovereign debt and exports. This manuscript aims to introduce a novel perspective, positing that China aspires to acquire a substantial portion of African countries' debt (Supporting Annex, **Figure A2**) to engender dependency and secure access to natural resources, a mechanism herein termed as "Resource-Backed Debt Model". Countries opt for participation in International Monetary Fund (IMF) programs due to a myriad of reasons, often intricate and politically motivated. Bird, Mylonas, and Rowlands (2015) elucidate that the decision to participate in IMF programs is not exclusively predicated on economic considerations but is a multifaceted decision, influenced by a confluence of economic and political variables. Governments might solicit IMF involvement for diverse reasons, ranging from enhancing economic performance and acquiring international credibility to exploiting political advantages. Conversely, the IMF employs a Debt Sustainability Framework (DSF) to navigate the borrowing decisions of low-income countries, necessitating periodic debt sustainability analyses of a country's projected debt burden over the ensuing decade and its susceptibility to economic and policy shocks. The DSF categorizes countries' debt-carrying capacities into three tiers: strong, medium, and weak, with varying indicative thresholds for debt burdens contingent on the country's debt-carrying capacity. The IMF and World Bank utilize the DSF in their analytical endeavors and policy advisories (IMF, 2023). Consequently, the IMF delineates explicit boundaries on a country's issuance of sovereign guarantees (for both concessionary and commercial credit) and assesses its financial country risk based on the DSF. This paper posits that the implementation of the IMF's DSF presented China with an opportunity to induce government dependency and ensure a sustained supply of natural resources as part of their "Resource-Backed Debt Model" strategy. It is hypothesized that, in certain African countries, China:

1) Extends concessionary and commercial credits in exchange for sovereign guarantees, typically adhering to the IMF's ceiling for sovereign guarantees set within the IMF's DSF for the respective country.

2) Continues to request sovereign guarantees, accepting collateral guarantees as an alternative that is typically structured to provide access to the nation's natural resources, which are later exported from that country to China. These natural resources are managed as a form of an instalment process.

3) Over a predetermined period, which we found to be six years, the exports to China mirror the trend of the country's debt acquired by China.

4) It is hypothesized that: a positive, robust, and direct correlation exists between the magnitude of national debt held by China in a resource-rich developing

country and the exports from that country to China, manifesting after one government mandate (over 5 completed years) (Figure 1).

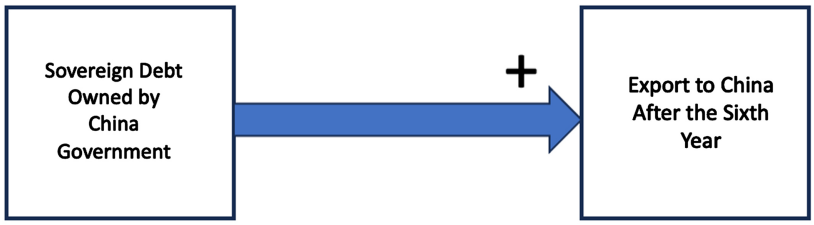

Figure 1. China's resource-backed debt model for Africa.

3. Methodology

Acquiring sensitive information pertaining to sovereign guarantees, government concessions, and government debts can often be challenging. Nonetheless, to substantiate our assertion that China deliberately converted sovereign guarantees (despite the associated political and economic risks) for collaterals (specifically, natural resources), we will examine the correlation between the value of specific government debt held by the Chinese government from 2009 to 2021 and the value of exports from those countries to China within the same timeframe. If China lacked interest in a country's resources, the employment of sovereign guarantees should not correlate directly to exports from that nation to China. However, if there exists a positive correlation between the issuance of sovereign guarantees and exports to China, it is reasonable to infer that the objective of the Chinese government was to secure resources (within the Resource-Backed Debt Model strategy). Indeed, existing literature (Brautigam & Tang, 2012; Li et al., 2013; Lind & Press, 2018; Saul, 2013; Wang & Yu, 2014) indicates that the Chinese government has been strategically investing and participating in economic activities in developing nations, with a particular emphasis on those abundant in natural resources. This evidence suggests that China's investments and economic endeavors extend beyond mere commercial interests and are significantly influenced by the availability of natural resources in the host nations. To have the big picture, it's important to analyze first Africa's sovereign debt for China and other countries, both private and bilateral (government-to-government, or G2G), between 2009 and 2021.

As seen in Figure 2, only bilateral debts with China (government debts) and private debts excluding China raised, as private debts with China kept stable, where the tendency of bilateral debts (other governments) have shrunken noticeably. This clearly shows a different agenda between the government of China and other governments in terms of debt acquisition. The tendency is to leave the debts to private entities, whereas China tends to acquire African debt directly. This is the first significant information, while this data is insufficient to state that China has a direct interest in the African debt, it suggests a significant engagement in this process.

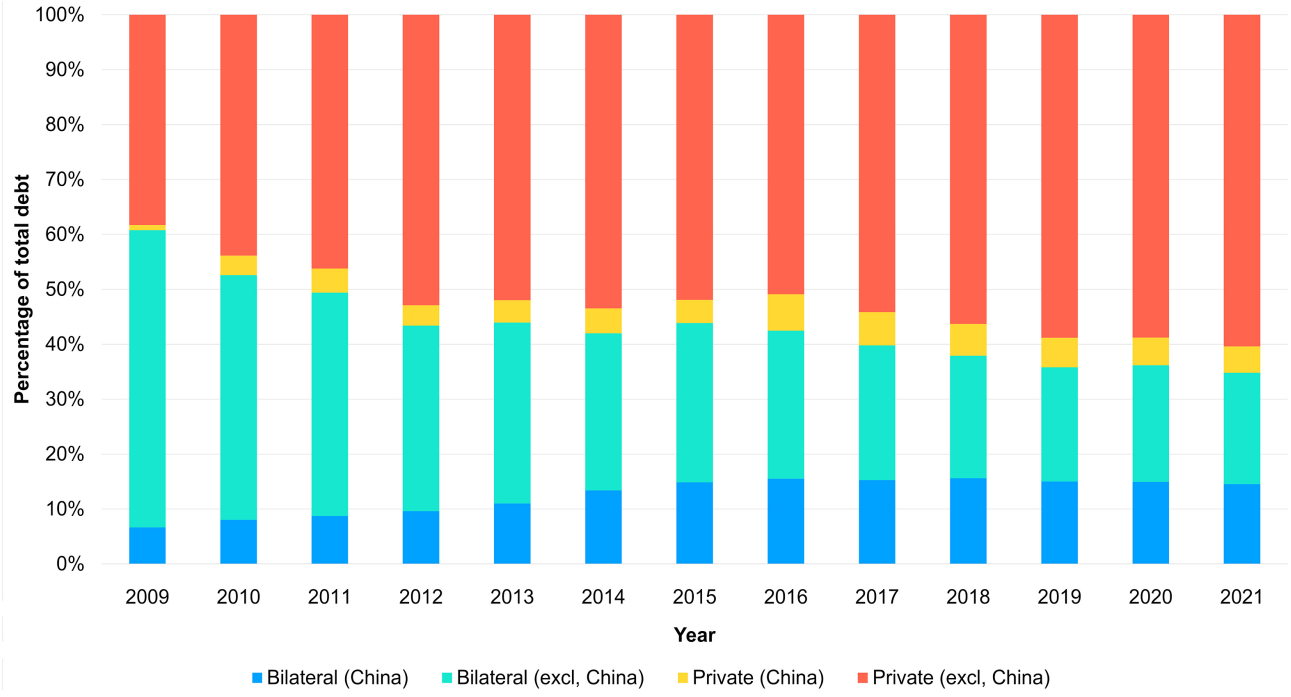

Figure 2. Africa's debt between 2009 and 2021 (Data by: Observatory of Economic Complexity).

We have selected three African countries rich in mineral resources to test our model: Democratic Republic of Congo (DRC), Kenya and Zimbabwe. First, we need to analyze each country's debt ownership between 2009 and 2021 (**Figures 3-5**).

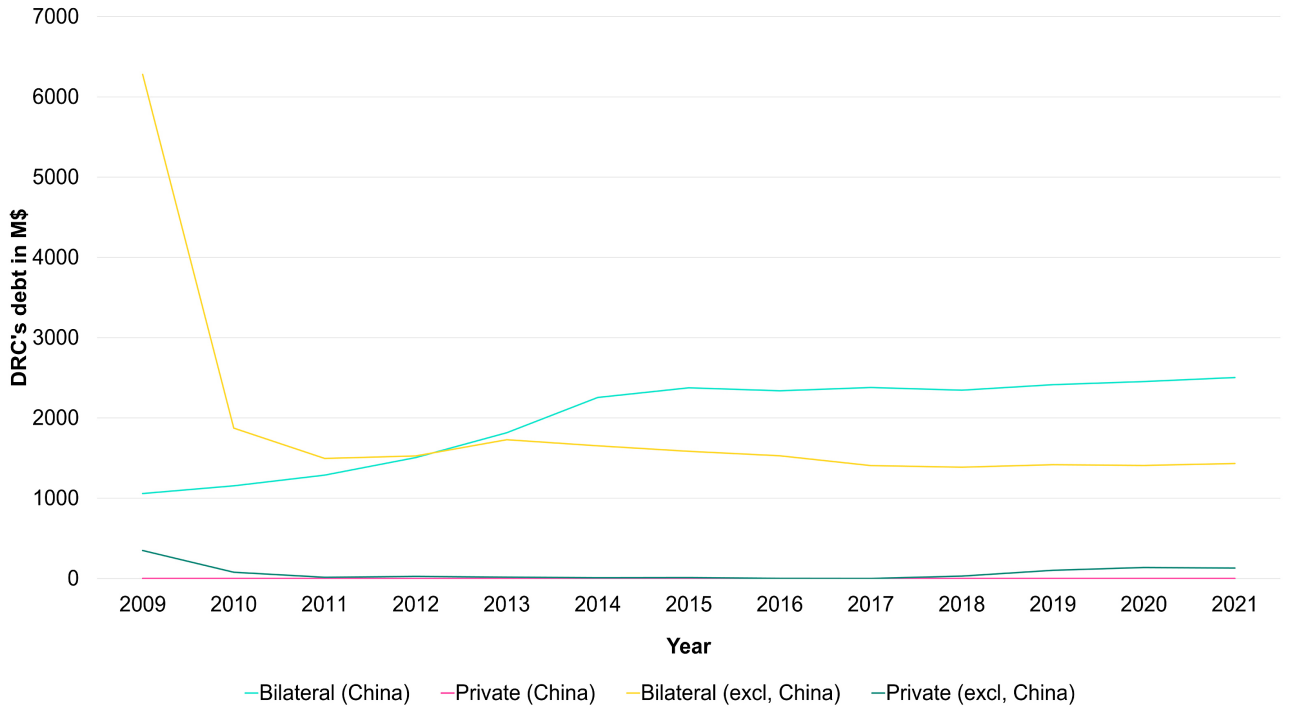

Figure 3. DRC's debt distribution between 2009 to 2021 (Data by: Observatory of Economic Complexity).

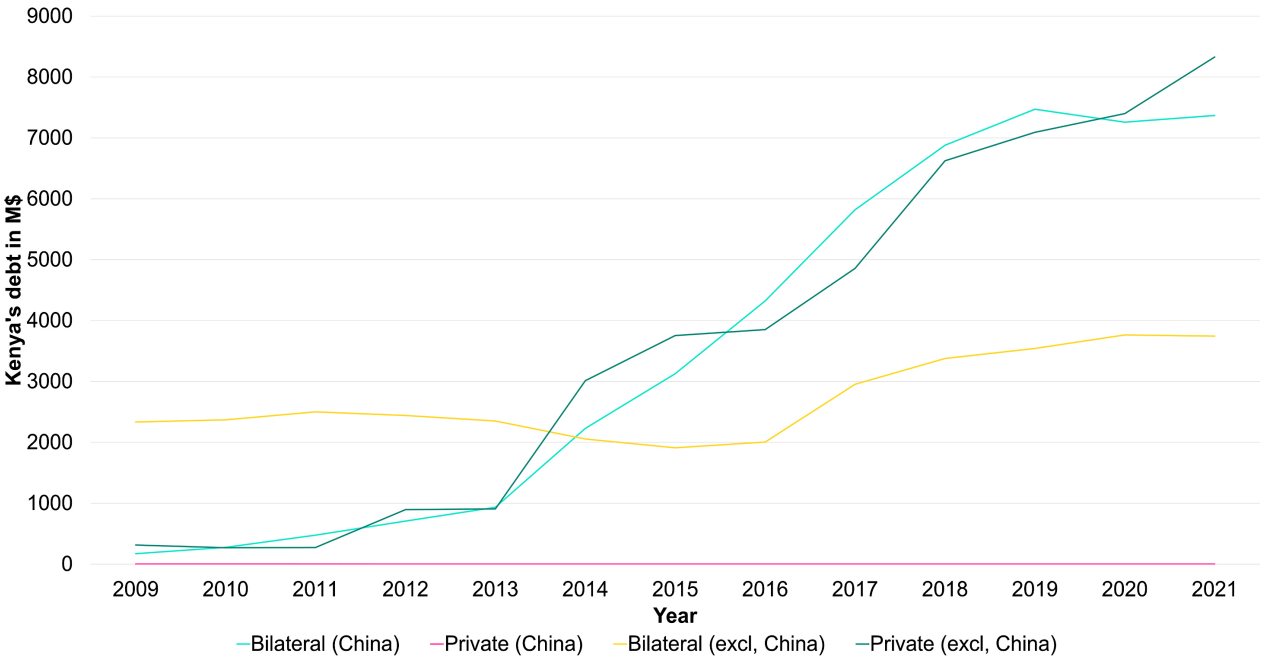

Figure 4. Kenya's debt distribution between 2009 to 2021 (Data by: Observatory of Economic Complexity).

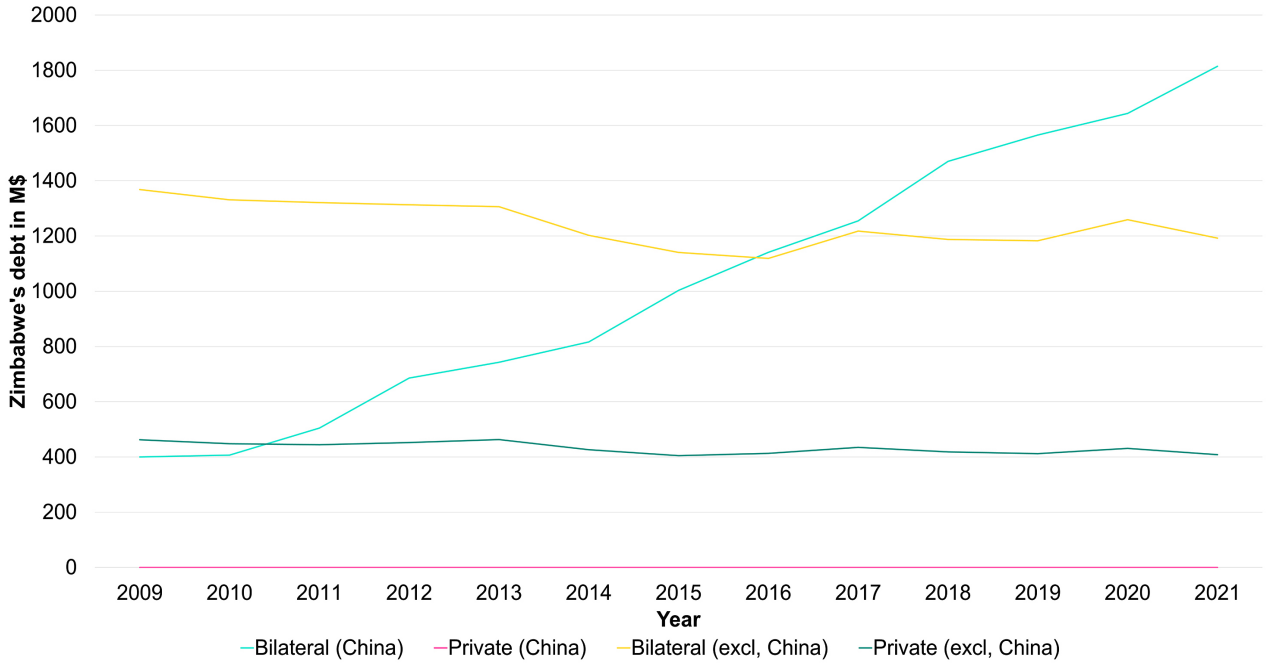

Figure 5. Zimbabwe's debt distribution between 2009 to 2021 (Data by: Observatory of Economic Complexity).

The initial insight we gleaned is that in all three nations, China's bilateral (G2G) lending has experienced an uptick. In economically challenged countries like Zimbabwe and the DRC, China holds the predominant share of debt, whereas in Kenya, which boasts a more robust economy relative to its African counterparts, the debt from China's bilateral agreements and the private sector (excluding China) are comparable. Essentially, China holds a substantial portion of

these countries' debt. As correctly stated by Ehikioya et al. (2020), properly managed external debt can support favorable growth, especially in developing economies with abundant opportunities to invest such funds in profitable projects. However, the concentration of a significant portion of a country's debt in the hands of a single foreign actor may give rise to various economic, political, and strategic considerations. This situation can engender economic reliance and susceptibility for the debtor nation, rendering it susceptible to the economic and policy sway of the creditor.

Such dynamics can influence the debtor's economic autonomy, encouraging adjustments in domestic policies to align with the strategic interests of major creditors. This alignment may reshape economic priorities and impact institutional decision-making, particularly when a single external actor holds a dominant share of sovereign debt. Emerging markets are particularly exposed to these dynamics, as they tend to rely more heavily on foreign capital inflows, making them susceptible to capital flight and sudden shifts in global risk perception (Fang, Hardy, & Lewis, 2022). Empirical evidence (Fang, Hardy, & Lewis, 2022; IMF, 2023) indicates that foreign investors hold over 40% of sovereign debt in many emerging economies, compared to less than 20% in advanced economies, thereby increasing their exposure to external financial volatility. The composition of debt holders plays a crucial role in financial stability, as non-bank investors exhibit greater sensitivity to risk fluctuations, often responding to macroeconomic shocks by adjusting their portfolios. Consequently, when a dominant creditor, whether a foreign government or a state-backed financial institution, holds a substantial share of national debt, debtor nations may experience heightened exposure to economic fluctuations. Historical data (Fang, Hardy, & Lewis, 2022) indicates that sudden shifts in foreign capital allocation have contributed to debt crises in various emerging economies, such as the 1997 Asian Financial Crisis and the 2018 Argentine peso collapse, underscoring the systemic risks associated with excessive reliance on external financing.

From a global perspective, creditor influence in sovereign debt markets extends beyond purely financial considerations, often shaping economic policies and international alignments. Multiple actors, including the International Monetary Fund (IMF), the European Union, and China, have played significant roles as major creditors in developing economies, each with distinct lending practices and strategic interests. Research suggests (IMF, 2023) that the predominance of a single creditor, particularly one with state-backed financial institutions, can affect bargaining dynamics in debt restructuring negotiations, influencing both short-term fiscal decisions and long-term policy orientation. For instance, in 2021, China held over $110 billion in African sovereign debt, making it the continent's largest bilateral lender (IMF, 2023). While this financial engagement has facilitated infrastructure development and trade expansion, it has also introduced complex renegotiation dynamics, particularly when debt agreements include resource-backed clauses. However, similar concerns have been raised in past engagements

between the IMF and highly indebted nations, where conditionalities linked to structural adjustments have influenced domestic policies (Bird, Mylonas, & Rowlands, 2015). Additionally, the commitment to fulfilling sovereign debt obligations can constrain fiscal space, potentially diverting resources from essential sectors such as infrastructure, healthcare, and social development. This phenomenon is not unique to any single creditor but reflects a broader challenge in sovereign debt management, wherein reliance on external financing must be carefully balanced with long-term economic sustainability. Moreover, legal complexities associated with sovereign debt agreements can entangle debtor nations in international arbitration disputes, particularly when collateral-backed arrangements involve strategic assets or resource concessions. The extent of these ramifications depends on contractual stipulations, the broader geopolitical context, and the investment preferences of sovereign and non-sovereign creditors. Notably, state-affiliated lenders, such as China's Export-Import Bank and the China Development Bank, have utilized resource-backed lending frameworks, a practice also observed in multilateral institutions such as the World Bank and IMF in past structural adjustment programs (Fang, Hardy, & Lewis, 2022).

Given these factors, emerging economies face heightened financial risks and limited policy flexibility, making sovereign debt composition and diversification critical elements of long-term economic resilience. Understanding these interdependencies is essential for evaluating the sustainability of debt-financed development and mitigating the risks associated with asymmetric creditor-debtor relationships. A comparative approach to sovereign debt management, incorporating lessons from both bilateral and multilateral lending structures, may provide policymakers with more robust frameworks for balancing external financing with domestic economic priorities. Subsequently, it is important to examine whether the debt acquired by China is linked to a pattern in which the trading of natural resources exported to China are part of broader financial vision. Understanding this dynamic can provide valuable insights into the structure of such agreements and their long-term economic implications. If exports to China demonstrate a positive and direct correlation with China's acquisition of national debt, it may suggest a broader strategic alignment or economic interdependence. We will now analyze and correlate government debt with exports to China, country by country.

As depicted in **Figure 6**, the DRC's exports to China have witnessed substantial growth between 2016 and 2021. When juxtaposed with **Figure 3**, it is evident that the growth trajectory of debt and exports does not align; the angles of growth between the two are disparate, foreseeing a lack of correlation (more evidence found in the supporting annex **Figure A3** and **Figure A4**). Let's delve deeper and explore the relationship between these two parameters by attempting to correlate them (**Table 1**).

The derived correlation between Debt and Exports stands at **0.58**. This represents a moderate, linear, albeit not robust, correlation that does not imply causation. However, this data does not robustly support our model. Let's proceed to

apply the same analytical approach to the remaining two countries (Figure 7).

Table 1. Debt and export data of DRC between 2009 and 2021 (Data by: Observatory of Economic Complexity).

Year	*Debt (M$)*	*Exports to China (M$)*
2009	1059	1101
2010	1155	2463
2011	1288	3054
2012	1506	3337
2013	1816	2617
2014	2255	2706
2015	2376	2599
2016	2340	2261
2017	2379	3956
2018	2347	7232
2019	2415	5774
2020	2454	8650
2021	2505	11,341

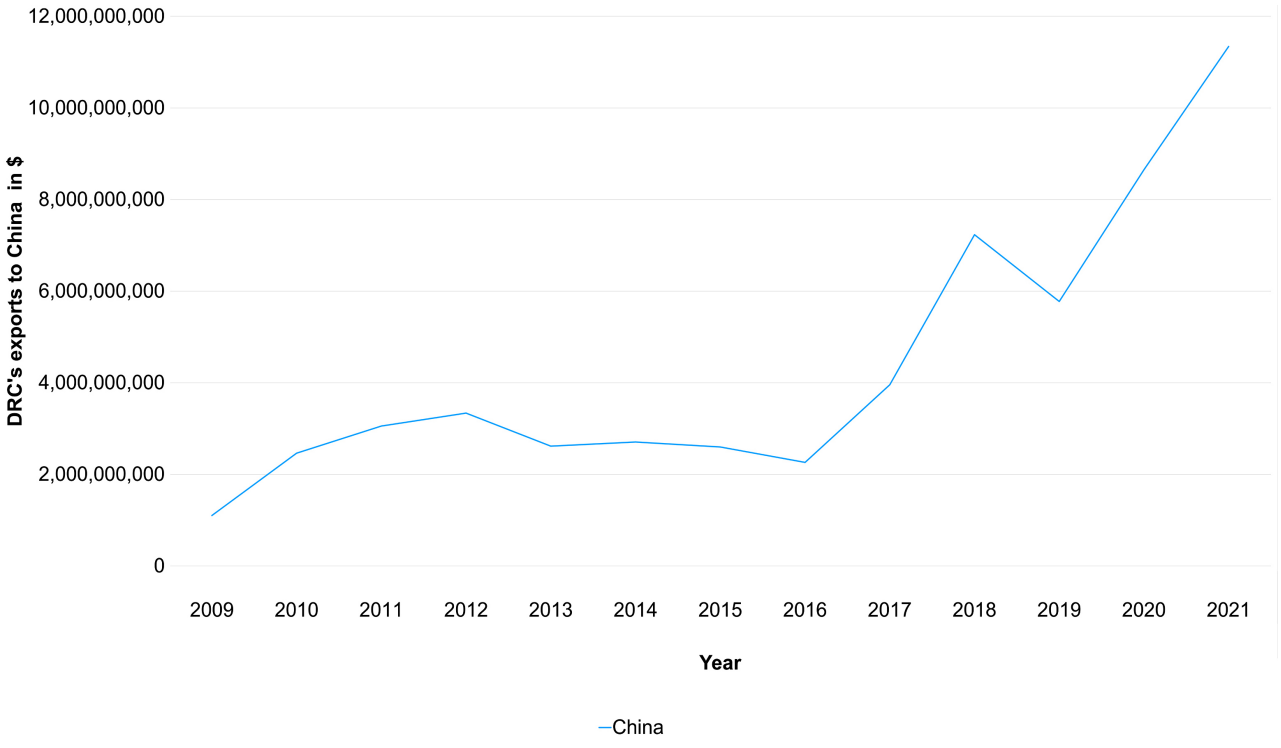

Figure 6. DRC's exports to China between 2009 and 2021 (Data by: Observatory of Economic Complexity).

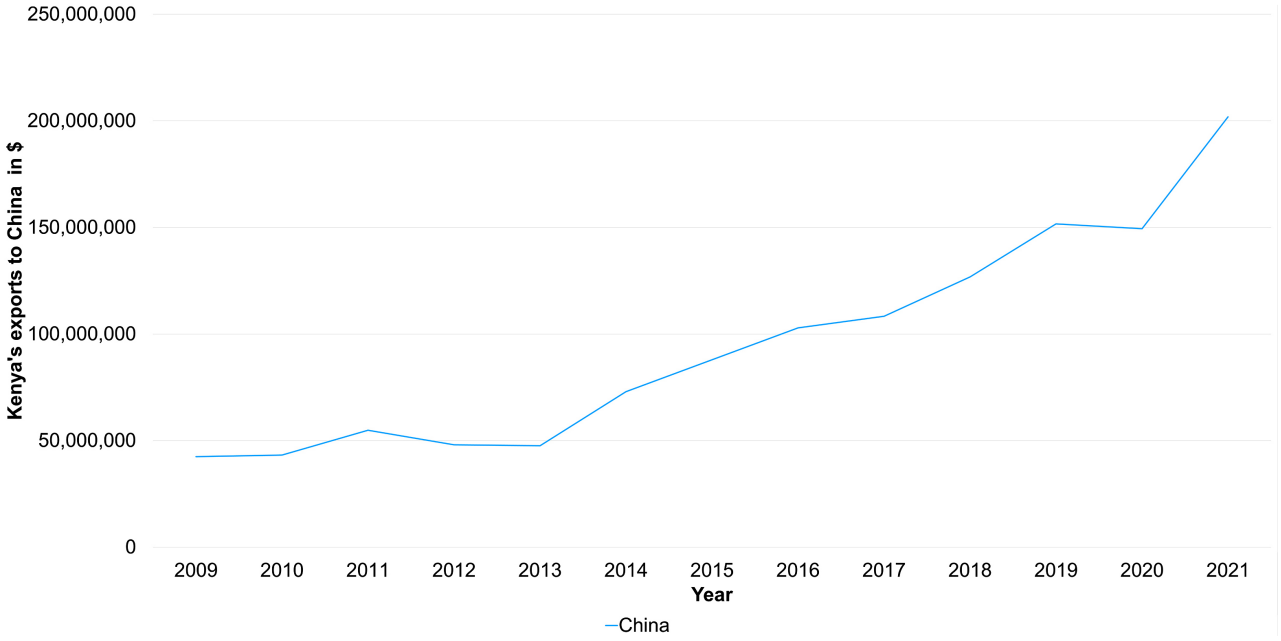

Figure 7. Kenya's exports to China between 2009 and 2021 (Data by: Observatory of Economic Complexity).

Similar to the trend observed in the DRC's exports to China, Kenya's indebtedness to China has also significantly escalated between 2013 and 2021. When compared to **Figure 4**, it is observable that the angles of growth between debt and exports, in this instance, bear a high degree of similarity, suggesting a strong, linear correlation (more evidence found in the supporting annex, **Figure A5** and **Figure A6**). Let's further investigate the relationship between these two parameters by attempting to establish a correlation (**Table 2**).

Table 2. Debt and export data of Kenya between 2009 and 2021 (Data by: Observatory of Economic Complexity).

Year	*Debt (M$)*	*Exports to China (M$)*
2009	171	42,487
2010	275	43,213
2011	476	54,839
2012	707	48,059
2013	933	47,614
2014	2230	72,976
2015	3127	87,925
2016	4323	102,886
2017	5820	108,335
2018	6879	126,810
2019	7471	151,642
2020	7258	149,434
2021	7368	201,877

The correlation between Debt and Exports is **0.94**. This is a strong, positive, and linear correlation, and thus it may support our model. Let's move to our last country (Figure 8).

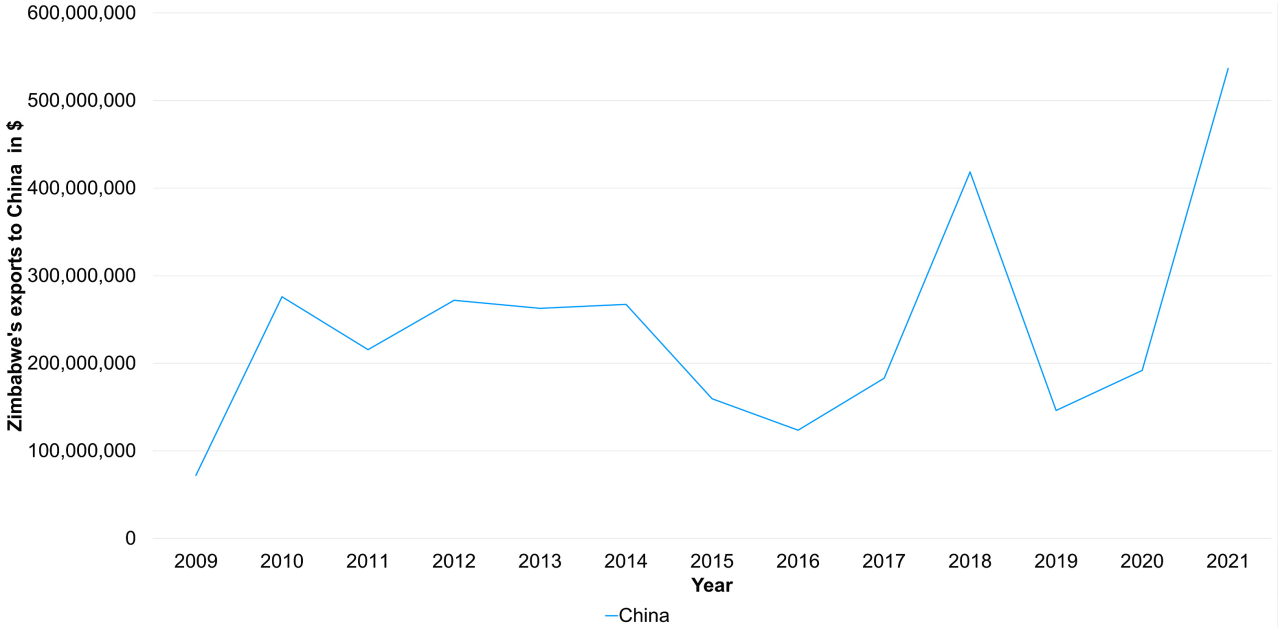

Figure 8. Zimbabwe's exports to China between 2009 and 2021 (Data by: Observatory of Economic Complexity).

For Zimbabwe, the exportations to China exhibit a nonlinear trajectory, culminating in a notable surge in 2021. When juxtaposed with Figure 5, it is apparent that the two trajectories diverge, indicating a potentially weak correlation (more evidence found in the supporting annex, Figure A7 and Figure A8). Let's proceed to correlate these two parameters to confirm this observation (Table 3).

Table 3. Debt and export data of Zimbabwe between 2009 and 2021 (Data by: Observatory of Economic Complexity).

Year	*Debt (M$)*	*Exports to China (M$)*
2009	399.8	72
2010	406.6	276
2011	504.9	216
2012	685.7	272
2013	743	263
2014	816.5	267
2015	1003.2	160
2016	1141.2	124
2017	1254.9	183
2018	1470.2	419
2019	1565.5	146
2020	1643.7	192
2021	1814.2	537

This analysis implies that, within our selected sample, our model does not find support in two out of the three instances. However, a crucial consideration must be made: the transformation of a sovereign guarantee into a collateral guarantee is a time-intensive process. Predicting the average duration of this process is challenging, as it is subject to variations due to internal factors such as bureaucracy and legislation, and external factors including G2G agreements and affiliations with international organizations, which can differ significantly from one country to another. Consequently, we will correlate the debt data of a specific year with the export data of the subsequent year, and so forth. We will incrementally extend this time lag by one year, up to a total of seven years, to identify the optimal correlation coefficient. This approach may potentially elucidate the average time required for the conversion of debt into collaterals.

Upon examining Table 4, it becomes evident that six years post the issuance of a sovereign guarantee, exports to China align with the trends in government debts for all three scrutinized countries, exhibiting strong, positive correlations. This finding is substantial and supports our model. Kenya manifests an enhanced correlation in its seventh year; however, it appears to maintain a strong, positive correlation consistently throughout the examined period, irrespective of the time lag. This persistent correlation may be attributable to various factors not central to this analysis, but conceivably, it could be ascribed to a sustained and enduring diplomatic and economic relationship between the two nations. This enduring relationship potentially fosters a continual issuance of sovereign debt, which is concomitantly correlated with a steady stream of exports to China.

Table 4. Correlations between government debt and export to China for DRC, Kenya and Zimbabwe per year of increment.

Delta Years	*Correlation*		
	DRC	Zimbabwe	Kenya
+1	56.69%	23.90%	95.53%
+2	61.54%	34.47%	96.42%
+3	73.56%	36.87%	95.03%
+4	85.78%	36.58%	94.70%
+5	88.68%	53.54%	95.64%
+6	**93.50%**	**69.80%**	92.56%
+7	93.28%	44.62%	**96.89%**

Our study identifies a strong and recurring correlation between sovereign debt acquired from China and subsequent increases in resource exports, particularly with a six-year lag. While we do not claim a direct causal link, the consistency of this pattern across multiple case studies, combined with the theoretical structure of resource-backed debt agreements, suggests that debt may functionally influence

trade flows. However, we acknowledge that correlation does not imply causation, and that external variables, such as commodity price fluctuations, domestic policy reforms, or broader geopolitical and market dynamics, may also contribute to the observed patterns. Further research using econometric methods and causal inference techniques is needed to disentangle these overlapping effects and better understand the underlying mechanisms. Additionally, the economic diversity of the DRC, Kenya, and Zimbabwe underscores the importance of contextualizing these results. While all three countries maintain financial ties with China, their structural differences, ranging from the DRC's resource-driven economy to Kenya's diversification, to Zimbabwe's institutional constraints, highlight that the relationship between sovereign debt and export flows is not uniform across all economies. The patterns we observe should not be interpreted as universally representative, but rather as a framework for understanding debt-export dynamics in resource-dependent economies. Expanding the analysis to a broader set of countries, with different debt structures and economic profiles, will be essential for assessing the broader applicability and limitations of our model.

4. Results and Discussion

Wang and Xu (2022) present an alternative perspective on Africa's debt challenges, advocating for a reassessment that considers a public sector balance sheet approach alongside the traditional IMF Debt Sustainability Analysis (DSA) framework. Their study examines China's financial engagements in Africa, often framed through the lens of debt sustainability, and highlights its role in supporting public asset expansion through infrastructure financing and development initiatives. Rather than viewing Chinese lending solely through the lens of risk, the Resource-Backed Debt Model suggests that debt agreements are often structured around long-term economic cooperation, particularly in sectors tied to natural resource exports. Empirical evidence (Wang & Xu, 2022) indicates that China has demonstrated flexibility in debt management, as reflected in its participation in the Debt Service Suspension Initiative (DSSI), where it deferred over $2.1 billion in repayments (Wang & Xu, 2022). Additionally, China allocated $10 billion from its Special Drawing Rights (SDRs) to assist nations facing debt distress (Wang & Xu, 2022; China Africa Research Initiative, 2021; CEPR, 2021). However, Wang and Xu (2022) emphasize the importance of enhancing transparency and risk assessment practices within Chinese financial institutions, particularly regarding macroeconomic risks and debt sustainability. They also highlight the need for improved coordination with other creditors to ensure efficient and systematic debt restructuring when required.

Venage (2014) notes that "natural resources can be seen as a new form of global currency, and China is using its cash to buy up the most." This perspective aligns with broader discussions on resource-backed financing models, where financial agreements are structured to facilitate long-term access to key commodities. Empirical data (Wang & Xu, 2022; IMF, 2023; SAIS-CARI, 2023) suggest a strong,

positive correlation between sovereign debt acquired by China and the volume of exports to China in three African nations (the Democratic Republic of Congo (DRC), Kenya, and Zimbabwe), with this relationship becoming evident approximately six years after the debt issuance (Wang & Xu, 2022; IMF, 2023). This pattern reflects broader trends in sovereign lending, where economic cooperation is often structured around trade and resource extraction agreements. Given that governmental mandates in many countries typically last five years, the emergence of economic shifts linked to sovereign debt issuance in the sixth year raises questions about whether this timing reflects a deliberate structural feature of resource-backed lending arrangements or is simply a consequence of macroeconomic cycles. Further research is needed to explore these dynamics and assess their long-term implications for economic resilience. China's financial engagement in Africa illustrates a broader trend in global sovereign lending, where infrastructure investments and trade relationships are increasingly linked to debt agreements. As sovereign debt structures continue to evolve, future studies should examine how various creditor nations, including multilateral institutions such as the IMF and World Bank, structure their financial engagements in resource-rich regions and what strategies debtor nations can employ to maintain economic autonomy while fostering development. While resource-backed debt agreements can offer African nations strategic benefits, such as infrastructure development and stable export channels, their effectiveness depends heavily on how they are managed (or mismanaged). The issue is not debt itself, but whether the valuation of exported resources reflects fair market prices and whether the quantities extracted are transparently monitored. If prices are set below market value or extraction volumes are poorly regulated, such agreements risk becoming exploitative, depriving debtor nations of the full value of their natural resources. To ensure mutual benefit, contracts should include mechanisms that align resource pricing with international benchmarks and certify extraction volumes, allowing the creditor to gain access, but not advantage, at the expense of the borrower. In this way, debt becomes a tool for development, rather than a vehicle for asymmetry, supporting both economic growth and national sovereignty.

5. Policy Recommendations

Based on our findings, African nations engaged in resource-backed debt agreements with China navigate both opportunities and challenges. While these agreements facilitate critical infrastructure development and trade expansion, they also introduce economic vulnerabilities, including debt sustainability risks, heightened export dependence, and constrained fiscal flexibility. To mitigate these risks, African nations must implement a comprehensive strategy cantered on debt diversification, enhanced transparency, economic resilience, coordinated debt restructuring efforts, and effective anti-bribery campaigns. By proactively addressing these challenges, governments can optimize the benefits of external financing while safeguarding economic sovereignty and ensuring long-term fiscal stability. A funda-

mental issue, however, lies not in the presence of debt itself, but in how the terms of resource-backed debt agreements are structured, particularly with respect to the valuation and management of the natural resources involved. If export commitments are priced fairly and transparently at market value, such agreements could provide debtor countries with predictable revenue streams and the stability needed to pursue long-term development strategies, including public investment and project financing. Under these conditions, China's role as a guaranteed buyer of raw materials could, in fact, benefit African nations by reducing volatility and enhancing economic planning.

The problem arises when the price of exported resources is set below market value, or when the volumes extracted are not adequately monitored, allowing the creditor to capitalize on undervalued assets in exchange for debt relief or infrastructure provision. In such cases, the debtor nation may not realize the full economic value of its resources, effectively transforming debt into a mechanism of exploitation rather than cooperation. To avoid these dynamics, resource-backed debt contracts must be designed with embedded safeguards that ensure fair pricing and transparent volume control. Agreements should stipulate independent price benchmarking mechanisms to align export values with international market rates over time, certified monitoring and reporting of resource extraction volumes, and clauses that prevent the undervaluation of natural wealth in the name of debt service. The advantage for the creditor should lie in secured access to resources, not in acquiring those resources at unfair terms that disadvantage the borrowing country. In this way, debt agreements can serve as balanced partnerships rather than extractive arrangements.

6. Limitations, Future Studies and Conclusion

6.1. Limitations

While this study provides valuable insights into China's financial engagements in Africa, several limitations should be acknowledged. Firstly, the analysis is confined to three African nations—DRC, Kenya, and Zimbabwe—which, although representative of China's economic footprint in resource-rich regions, do not encompass the full spectrum of its engagements across the continent. Future studies incorporating a larger dataset would enhance the generalizability of these findings. Secondly, data accessibility posed a significant constraint. Obtaining precise figures on sovereign guarantees, government concessions, and collateralized debt agreements proved challenging, potentially impacting the depth of this study's empirical validation. Increased transparency in sovereign debt reporting would facilitate a more robust assessment. Thirdly, the study identifies a strong correlation between debt acquisition and export growth with a six-year lag yet does not establish definitive causality. External factors such as market demand fluctuations, policy changes, and geopolitical shifts could also contribute to these patterns, warranting further investigation. Internal economic and political dynamics within the debtor nations were not extensively analyzed. Variables such as governance qual-

ity, fiscal policies, and institutional frameworks could play a crucial role in shaping these debt-trade interactions.

Recent studies have shown that rising debt levels in Africa are increasingly constraining fiscal space, limiting government expenditure on essential public services such as health, education, and infrastructure (Ibrahim & Atta-Mensah, 2024). These constraints have been linked to widening social inequalities and developmental stagnation, particularly in low- and middle-income economies (Brookings Institution, 2023; UNCTAD, 2023). In cases where debt agreements are opaque or inflexible, they may further restrict a government's capacity to respond to economic shocks or exercise full autonomy over fiscal and trade policy. Although our work does not directly model these internal consequences, our findings, particularly those regarding the structuring of resource-backed debt and its linkage to export flows, may serve as a foundation for future studies aimed at understanding how external financial commitments reshape domestic policy space and long-term development planning. Therefore, by selecting three economies that are inherently diverse in their structure and economic profiles, we aim to reduce the likelihood that the observed correlations are merely the result of country-specific or context-specific events as previously mentioned. While this approach does not eliminate all limitations related to external validity, it does help to mitigate their impact. As such, we acknowledge that the heterogeneity among the case studies represents both a limitation and a methodological strength: a limitation in terms of generalizability, but also a deliberate strategy to test the robustness of the observed patterns across varied contexts.

6.2. Future Studies

The study found a correlation between debt and exports to Cina adding all exports throughout all industries. Building on the findings of this research, several areas warrant further exploration. Expanding the geographical scope of the analysis would provide a broader understanding of whether the observed six-year debt-export correlation is consistent across other African nations engaged in resource-backed debt agreements with China. A comparative approach, incorporating multiple countries with varying economic structures, could help determine whether this pattern is a generalized phenomenon or contingent on specific local factors.

Additionally, further investigation is needed to assess how China's lending strategies compare to those of other major creditors, such as the IMF, World Bank, and bilateral lenders like the EU and the USA. Understanding these differences would shed light on how diverse sovereign lending models influence debt sustainability, economic resilience, and policy autonomy in debtor nations. By analyzing these distinctions, future research could provide valuable insights into the structural advantages and risks associated with different financing mechanisms.

Another crucial avenue for study involves identifying the causal mechanisms underlying the debt-export relationship. While this study finds a strong correlation, it does not establish whether China's debt acquisitions directly drive export growth or merely coincide with pre-existing economic trends. Employing econo-

metric modelling and longitudinal analyses would allow scholars to assess whether debt issuance precedes and actively influences trade expansion or whether other macroeconomic factors contribute to the observed trend.

Moreover, further research into the legal and policy frameworks governing Chinese sovereign lending could provide deeper insight into the long-term economic implications of these agreements. Examining the contractual terms of Chinese loans—such as interest rates, repayment structures, and default clauses—alongside domestic economic policies in recipient countries would offer a more comprehensive view of the sustainability of these debt arrangements. Finally, the role of political economy and diplomatic relations in shaping these financial engagements should not be overlooked. Future studies could explore how geopolitical alignments, and strategic interests influence the structuring, renegotiation, and outcomes of sovereign debt agreements. As China continues to expand its economic presence in Africa, understanding the broader geopolitical ramifications of its financial diplomacy will be essential for assessing the long-term impact of these engagements.

6.3. Conclusion

This research has examined the intricate dynamics between China's sovereign debt acquisitions and resource-backed trade agreements in Africa, focusing on DRC, Kenya, and Zimbabwe. The findings reveal a strong, positive correlation between Chinese debt and export growth, becoming evident approximately six years after the debt issuance. These results lend empirical support to the Resource-Backed Debt Model, suggesting that China strategically aligns its financial engagements with long-term resource acquisition objectives. However, the study also highlights the complexities of these debt relationships, raising questions about economic dependence, financial stability, and policy autonomy for debtor nations. From a global perspective, these insights contribute to broader discussions on sovereign debt sustainability, creditor influence, and economic interdependencies in international finance. Policymakers must navigate these challenges by ensuring greater transparency, diversification of debt portfolios, and strategic economic planning. Ultimately, understanding China's role in Africa's financial landscape is critical not only for academic discourse but also for shaping policies that balance economic cooperation with sustainable development. Future research should continue to investigate these dynamics, refining the models and methodologies used to assess the long-term impacts of sovereign debt agreements in emerging markets.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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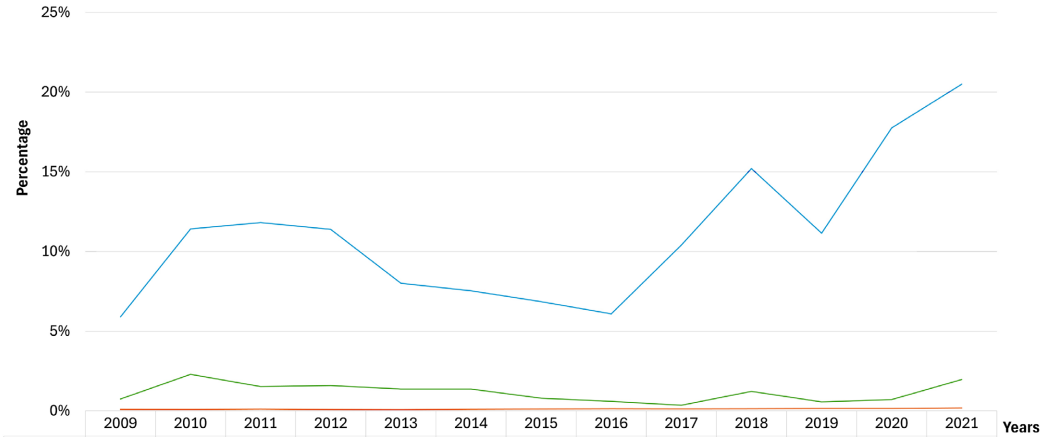
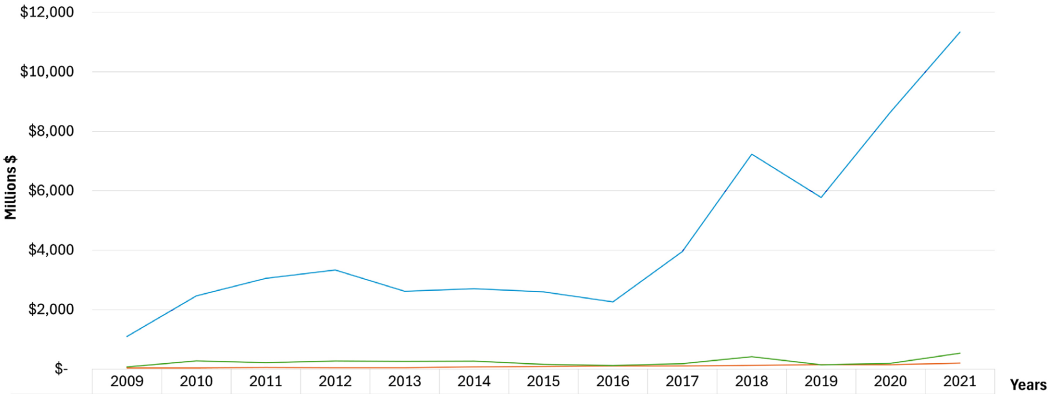
Supporting Annex



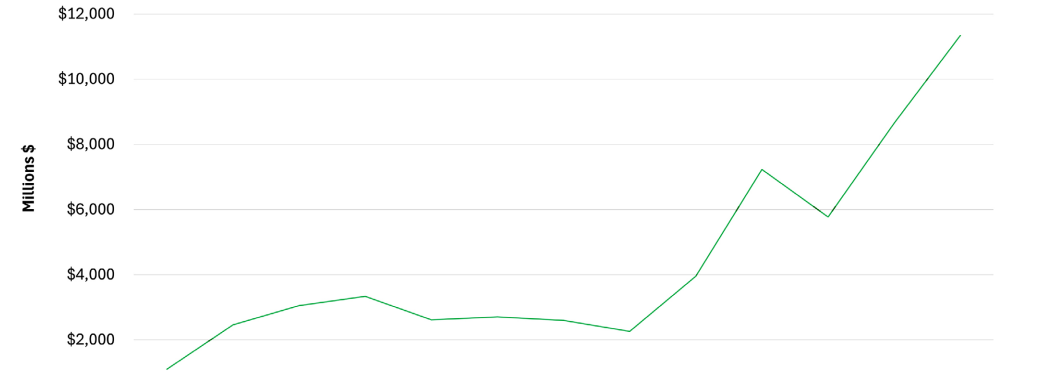
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Years
Kenya	0.10%	0.10%	0.12%	0.09%	0.08%	0.11%	0.13%	0.14%	0.13%	0.14%	0.15%	0.15%	0.18%	
DRC	5.90%	11.42%	11.82%	11.39%	8.01%	7.53%	6.85%	6.09%	10.40%	15.20%	11.15%	17.75%	20.50%	
Zimbabwe	0.75%	2.29%	1.53%	1.59%	1.38%	1.37%	0.80%	0.60%	0.36%	1.23%	0.57%	0.71%	1.97%	

Figure A1. Export on GDP for Kenya, DRC and Zimbabwe.



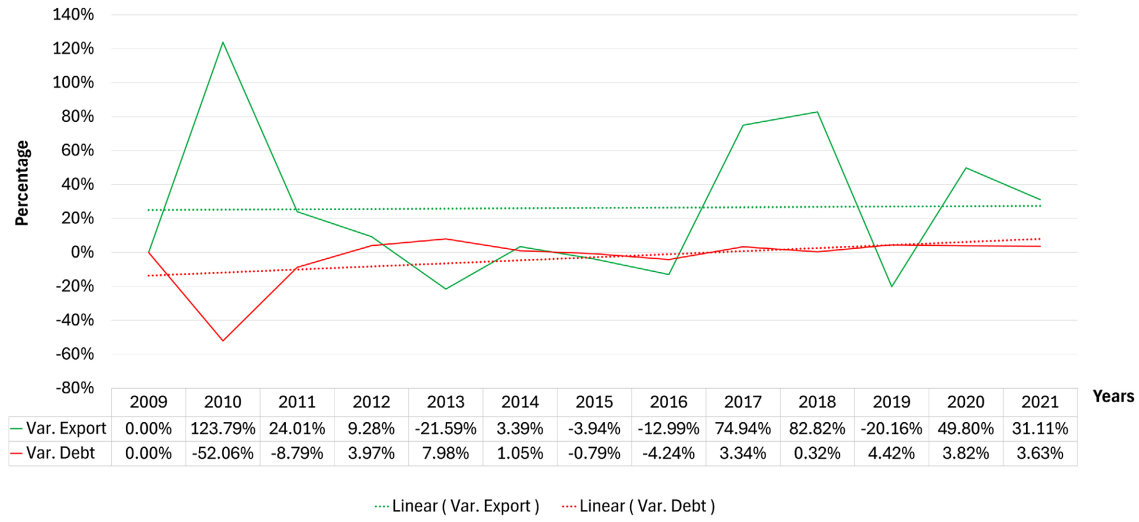
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Years
Kenya	$42,488	$43,213	$54,838	$48,059	$47,614	$72,976	$87,924	$102,88	$108,33	$126,80	$151,64	$149,43	$201,87	
DRC	$1,100,	$2,462,	$3,054,	$3,337,	$2,616,	$2,705,	$2,598,	$2,261,	$3,955,	$7,231,	$5,774,	$8,649,	$11,340	
Zimbabwe	$72,115	$276,06	$215,66	$271,96	$262,74	$267,27	$159,60	$123,65	$182,93	$418,53	$146,22	$191,88	$536,52	

Figure A2. Export to China for Kenya, DRC and Zimbabwe.



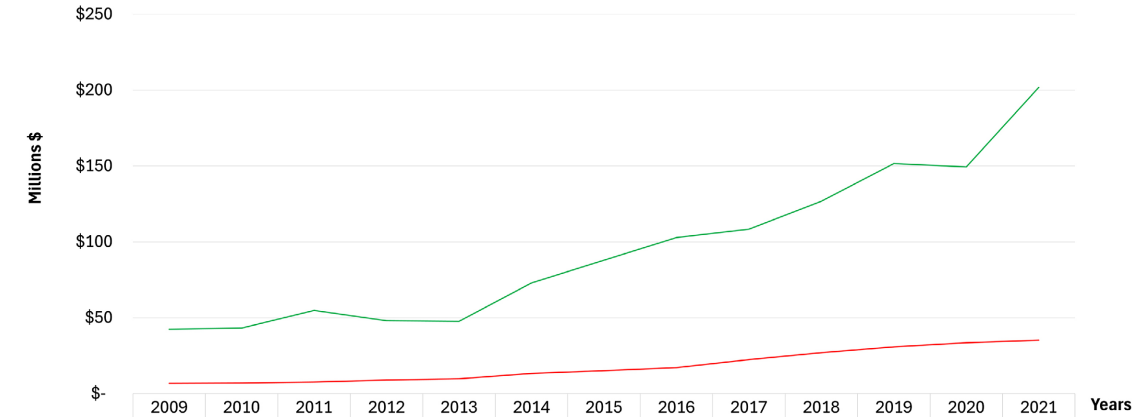
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Years
Export to China	$1,100	$2,462	$3,054	$3,337	$2,616	$2,705	$2,598	$2,261	$3,955	$7,231	$5,774	$8,649	$11,34	
Debt w China	$11,87	$5,691	$5,191	$5,397	$5,828	$5,889	$5,843	$5,595	$5,782	$5,800	$6,057	$6,288	$6,516	

Figure A3. DRC's export to China Vs. debt with China.



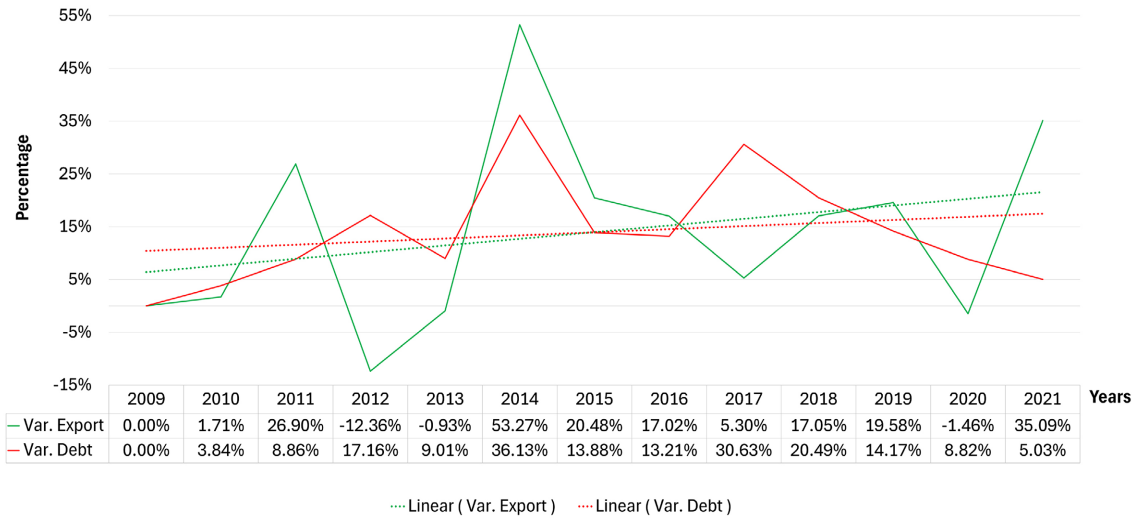
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Var. Export	0.00%	123.79%	24.01%	9.28%	-21.59%	3.39%	-3.94%	-12.99%	74.94%	82.82%	-20.16%	49.80%	31.11%
Var. Debt	0.00%	-52.06%	-8.79%	3.97%	7.98%	1.05%	-0.79%	-4.24%	3.34%	0.32%	4.42%	3.82%	3.63%

Figure A4. DRC's export and debt variations.



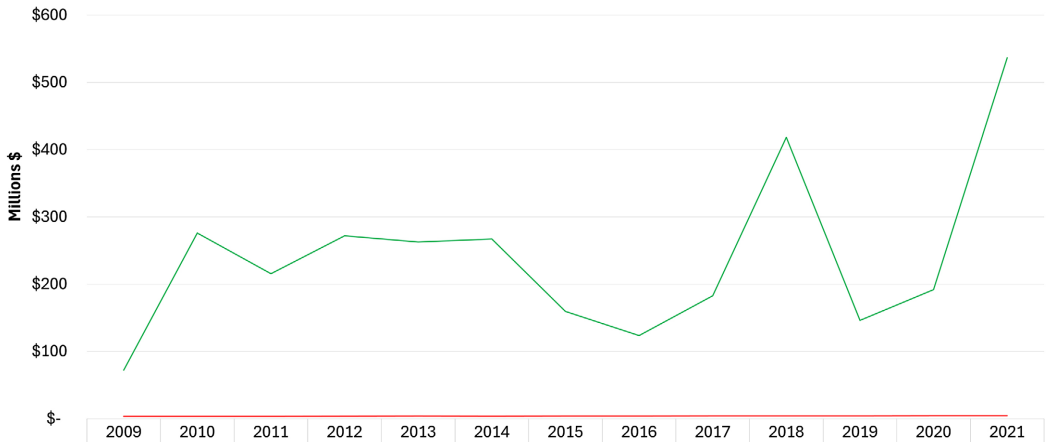
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Export to China	$42.48	$43.21	$54.83	$48.05	$47.61	$72.97	$87.92	$102.8	$108.3	$126.8	$151.6	$149.4	$201.8
Debt w China	$6.767	$7.027	$7.650	$8.962	$9.770	$13.30	$15.14	$17.14	$22.39	$26.98	$30.81	$33.53	$35.21

Figure A5. Kenya's export to China Vs. debt with China.



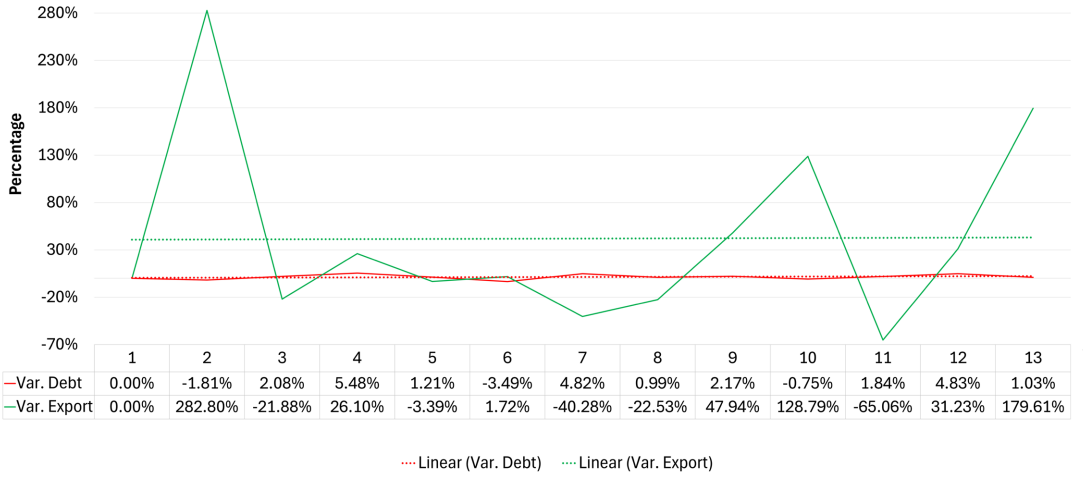
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Var. Export	0.00%	1.71%	26.90%	-12.36%	-0.93%	53.27%	20.48%	17.02%	5.30%	17.05%	19.58%	-1.46%	35.09%
Var. Debt	0.00%	3.84%	8.86%	17.16%	9.01%	36.13%	13.88%	13.21%	30.63%	20.49%	14.17%	8.82%	5.03%

Figure A6. Kenya's export and debt variations.



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Export to China	$72.115	$276.06	$215.66	$271.96	$262.74	$267.27	$159.60	$123.65	$182.93	$418.53	$146.22	$191.88	$536.52
Debt w China	$3.869,	$3.799,	$3.878,	$4.091,	$4.141,	$3.996,	$4.189,	$4.230,	$4.322,	$4.289,	$4.368,	$4.579,	$4.626,

Figure A7. Zimbabwe's export to China Vs. debt with China.



	1	2	3	4	5	6	7	8	9	10	11	12	13
Var. Debt	0.00%	-1.81%	2.08%	5.48%	1.21%	-3.49%	4.82%	0.99%	2.17%	-0.75%	1.84%	4.83%	1.03%
Var. Export	0.00%	282.80%	-21.88%	26.10%	-3.39%	1.72%	-40.28%	-22.53%	47.94%	128.79%	-65.06%	31.23%	179.61%

Figure A8. Zimbabwe's export and debt variations.