

Risk Management In Volatile Markets In Timor-Leste

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ABSTRACT

This paper examines risk management in the context of market volatility in Timor-Leste, a small, resource-dependent economy facing persistent fiscal, environmental, and institutional vulnerabilities. The study is motivated by the country's continued reliance on petroleum revenues, limited economic diversification, and growing exposure to global shocks such as commodity price fluctuations and climate events. The central research question is: How can Timor-Leste manage economic risks in the face of increasing market volatility to ensure long-term fiscal and economic stability? The novelty of this paper lies in its integrated analysis of macroeconomic, financial, operational, and environmental risks, specifically tailored to Timor-Leste's structural conditions an area that remains under-researched in existing literature. Employing a qualitative-descriptive method, this study is based on secondary data drawn from government reports and multilateral publications, including economic performance reviews, trade statistics, and institutional assessments from 2018 to 2024. Findings indicate that despite modest GDP growth recovery and reduced inflation in 2024, fiscal sustainability remains at risk due to overreliance on the Petroleum Fund and low domestic revenue. The research highlights key mitigation strategies, including fiscal discipline, economic diversification, financial sector strengthening, and climate-resilient infrastructure investment. The study concludes that effective risk management in Timor-Leste requires coordinated institutional action, supported by long-term reforms. The findings offer practical insights for policymakers and stakeholders seeking to reduce volatility and promote inclusive, sustainable growth.

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1. Introduction

Timor-Leste's economy operates in an environment marked by pronounced volatility manifested in frequent and often unpredictable fluctuations in key economic indicators. As a small, open, and import-dependent nation, Timor-Leste remains particularly vulnerable to external shocks. The country's economic performance is heavily influenced by global fuel prices, exchange rate variability, and the volatility of government expenditure patterns. With the U.S. dollar serving as its official currency, Timor-Leste is shielded from domestic exchange rate instability; however, it remains exposed to global currency market shifts. As a result, the cost of vital imports including fuel, food, and

construction materials-can fluctuate significantly, contributing to inflationary pressures and undermining household purchasing power (BCTL, 2024; IndexMundi, 2023).

Fuel imports, in particular, present a notable vulnerability. According to the Timor-Leste Annual Trade Statistics 2023, fuel is one of the largest import categories, with price changes directly affecting transportation costs and the pricing of essential goods. The country's fiscal framework is also sensitive to external commodity markets. Timor-Leste's Petroleum Fund established to manage revenues from offshore oil and gas-has been the primary source of budget financing since independence. However, persistent withdrawals exceeding the Estimated Sustainable Income (ESI), coupled with the cessation of production from the Bayu-Undan field, have raised serious concerns over the long-term viability of this fund (IMF, 2024; World Bank, 2024).

Moreover, delays in the development of the Greater Sunrise oil and gas project have deepened fiscal uncertainty. With new revenues unlikely to materialize in the short term, the country faces the twin challenges of declining oil-based income and rising fiscal needs. As emphasized by the UNDP and Coface, this situation risks eroding the fund's value, threatening future public investment, service delivery, and macroeconomic stability.

Timor-Leste's heavy reliance on imports and a limited export base further compounds its economic fragility. In 2023, the country imported goods worth nearly USD 900 million, while exports—dominated by coffee and petroleum products-totaled only around USD 200 million, generating a significant trade deficit (Timor-Leste Annual Trade Statistics, 2023; TATOLI). This imbalance heightens exposure to global price shocks. The impact of the war in Ukraine, for example, drove up international prices for rice and cooking oil-two essential imports for Timorese households-necessitating direct government subsidies to cushion the burden on consumers (IMF eLibrary, 2024).

Structural limitations also hinder Timor-Leste's economic resilience. The private sector remains underdeveloped, contributing only marginally to total investment. According to the Böll Foundation Southeast Asia (2022), investment in non-oil sectors stood at just USD 16 million-around 5% of total investment-highlighting the country's ongoing dependence on state-led spending. Agriculture, once seen as a cornerstone for economic diversification, has seen its share of GDP fall from 25% in 2010 to 20% in 2021, with average growth below 2% annually (World Bank, 2024). Meanwhile, the labor market faces persistent challenges: youth unemployment hovers around 30%, labor force participation remains low, and much of the population is engaged in low-productivity subsistence farming (Coface, 2023).

This complex backdrop calls for robust and forward-looking risk management strategies. The volatility of Timor-Leste's economic landscape cannot be addressed solely through reactive policy responses. Instead, the country must pursue a comprehensive approach that strengthens resilience and enhances its ability to absorb and adapt to shocks. This includes fostering economic diversification-particularly by developing agriculture, tourism, and light manufacturing-to reduce dependency on oil revenues. Equally important is advancing fiscal sustainability through prudent Petroleum Fund management and improved domestic revenue mobilization, as consistently advised by the IMF, BCTL, and Coface.

Further, Timor-Leste must enhance private sector development through regulatory reform, improved infrastructure, and targeted support for entrepreneurship and small enterprises. Policies that encourage import substitution and local value creation can help reduce the country's exposure to global commodity cycles. Finally, sustained investments in education, vocational training, and labor market alignment are essential to empower the Timorese workforce and drive inclusive growth.

This paper explores how Timor-Leste can adopt effective risk management strategies tailored to its unique vulnerabilities and structural realities. By anticipating risks and institutionalizing proactive responses, Timor-Leste can chart a more stable, diversified, and inclusive economic future.

2. Literature Review

Definition of Market Volatility

Market volatility refers to the degree of variation in the price of a financial instrument, commodity, or asset over time. It is often measured by standard deviation or variance in returns and reflects the uncertainty or risk in the market. According to Hull (2017), volatility is a statistical measure of the dispersion of returns and plays a central role in asset pricing, portfolio management, and risk assessment. Volatility can be driven by a variety of factors, including macroeconomic indicators (GDP, inflation, interest rates), geopolitical events, changes in investor sentiment, and structural characteristics of financial markets. In the context of developing economies, volatility is often more pronounced due to weaker institutional frameworks, limited financial market depth, and higher exposure to external shocks.

Sources of Market Volatility

Global Commodity Prices

For commodity-dependent countries, volatility in global prices—such as oil, food, or metals—has a direct impact on fiscal revenues and inflation. Hamilton (2003) and Baffes et al. (2015) highlight how commodity price volatility affects not only government revenues but also exchange rates and investment decisions in resource-dependent economies.

Exchange Rate Fluctuations

In countries using foreign currencies like the U.S. dollar (as in Timor-Leste), exchange rate movements in global currency markets affect import prices and trade balances. According to Krugman and Obstfeld (2018), unmanaged exchange rate systems expose countries to imported inflation and limit monetary policy flexibility.

Political and Policy Uncertainty

Political instability and regulatory unpredictability increase investor risk perception, triggering capital flight or delayed investment decisions. Baker, Bloom, and Davis (2016) created an economic policy uncertainty index that correlates strongly with stock market volatility and slowed economic activity.

Volatility in Emerging and Frontier Markets

Emerging markets often face higher volatility due to structural weaknesses such as low export diversification, reliance on foreign aid or remittances, and shallow financial markets. Studies by Raddatz (2007) and Calvo and Reinhart (2002) emphasize that external shocks—such as interest rate changes in advanced economies or commodity price swings—are magnified in less resilient economies. In frontier markets like Timor-Leste, this volatility is exacerbated by:

1. A narrow economic base, with dependence on oil revenues.
2. Large trade deficits, caused by reliance on imported essentials.
3. Weak institutions, including regulatory and legal enforcement.
4. Limited private sector participation in economic activity.

Impact of Market Volatility on Development Goals

Volatility undermines fiscal planning, distorts investment incentives, and disrupts poverty reduction efforts. For instance, UNDP (2022) and World Bank (2024) reports warn that economic shocks in Timor-Leste such as oil price crashes or rising food import costs can derail public investment in infrastructure and social services.

Prolonged volatility can lead to:

1. Rising inflation and erosion of household purchasing power.
2. Budget shortfalls, leading to reduced government service delivery.
3. Lower foreign direct investment due to perceived instability.
4. Increased unemployment, particularly among youth.

Risk Management Theory

The concept of risk has long played a central role in decision-making under uncertainty, particularly in economics, finance, and strategic planning. A seminal contribution to the theoretical foundation of risk management came from Frank H. Knight (1921) in his influential work *Risk, Uncertainty, and Profit*. Knight made a critical distinction between two types of unpredictability: risk, where outcomes are unknown but the probability distribution is measurable, and uncertainty, where both outcomes and probabilities are inherently unknowable. This distinction has enduring value in contemporary risk analysis, particularly in volatile and fragile contexts such as climate shocks, pandemics, and geopolitical crises. Recent studies, such as Behl et al. (2023) in the *Journal of Risk and Financial Management*, reaffirm the importance of distinguishing between measurable risks and deep uncertainties when designing organizational and public policy responses. Moreover, Mazzucato & Kattel (2021) emphasize the need for governments to act under uncertainty using adaptive tools and mission-oriented frameworks-further validating Knight's early differentiation in current economic governance debates.

Building on this foundation, Harry Markowitz (1952) introduced Modern Portfolio Theory (MPT), a landmark in quantitative risk management. MPT proposed that investors can optimize the balance between risk and return by combining assets with different correlations, thus reducing unsystematic risk through diversification. In this model, risk is mathematically captured by the standard deviation of expected returns. Recent empirical work continues to support and extend these principles. For example, Naseem et al. (2022) apply MPT to emerging markets and sustainable investment portfolios, demonstrating that diversification remains a powerful risk-mitigation strategy, even in ESG and green finance contexts. Meanwhile, Chakrabarti and Sen (2020) revisit MPT's assumptions in the context of behavioral biases and propose hybrid models that combine Markowitz's rational optimization with heuristics-based investor behavior. Additionally, institutions such as sovereign wealth funds (e.g., Timor-Leste's Petroleum Fund) continue to apply MPT-based strategies to manage long-term revenue risks in resource-dependent economies, as noted in the IMF's 2024 Fiscal Transparency Report. The enduring relevance of MPT is evident in how both traditional and alternative investment strategies are still grounded in its core insight: risk can be mathematically modeled, mitigated, and managed.

Risk Management in the Public Sector

In recent decades, risk management in the public sector has gained increasing prominence, especially as governments worldwide face complex and interrelated risks such as fiscal crises, pandemics, natural disasters, cyber threats, and political instability. For developing and fragile states like Timor-Leste, the stakes are particularly high, given limited institutional capacity, economic

vulnerability, and dependence on external revenues. Institutions such as the World Bank (2013, 2016), OECD (2020), and International Monetary Fund (IMF, 2023–2024) have stressed the need for integrated Public Sector Risk Management (PSRM) systems to enhance state resilience, ensure budget credibility, and safeguard developmental progress.

One of the most widely cited models is the Fiscal Risk Management Framework, advocated by the World Bank and the IMF. This framework helps governments identify, quantify, and manage fiscal exposures that arise from contingent liabilities, macroeconomic shocks, natural disasters, and public-private partnerships (PPPs). It provides tools such as fiscal risk statements, stress tests, and early warning indicators to improve transparency and accountability. For example, Timor-Leste's heavy reliance on the Petroleum Fund means its fiscal position is vulnerable to oil price fluctuations and production uncertainty. The IMF's 2024 *Fiscal Transparency and Risk Assessment Report* recommends enhancing fiscal buffers and developing non-oil revenue strategies as critical components of risk mitigation.

In parallel, Strategic Crisis Management Models, supported by the OECD (2020) and UNDRR, emphasize a broader risk governance approach, integrating not only financial but also operational and systemic risks. These models focus on risk anticipation, inter-agency coordination, emergency preparedness, and resilience building across all levels of government. The OECD identifies six key pillars for strategic risk governance: anticipation, leadership, coordination, capacity, communication, and learning. In fragile settings, these pillars help governments respond more effectively to shocks such as natural disasters or pandemics, both of which have deeply affected Timor-Leste in the last decade.

Moreover, recent research highlights the importance of institutionalizing PSRM through legislation, capacity-building, and digital tools. According to Williams et al. (2022) in *Public Administration Review*, effective public risk management depends on clear mandates, political commitment, and integration with performance management systems. Without these, risk management remains fragmented and reactive. UNDP (2023) similarly argues that PSRM should be embedded into national development strategies, with ministries of finance, planning, and disaster management working collaboratively to address intersecting risks.

ISO 31000: Risk Management Principles and Guidelines

ISO 31000 is the international benchmark for risk management, developed by the International Organization for Standardization (ISO). First released in 2009 and revised in 2018, ISO 31000 provides a comprehensive and adaptable framework that can be applied to any organization—public or private, large or small—regardless of industry or geography. The standard does not prescribe a one-size-fits-all model but instead offers universal principles and guidelines for establishing, implementing, and continually improving risk management processes. At the core of ISO 31000 are eight interrelated principles that guide effective risk management:

1. Integration—Risk management should be an integral part of all organizational processes, from strategic planning to operational execution.
2. Structured and comprehensive – A structured and thorough approach ensures consistent and comparable results.
3. Customized—The framework must be tailored to the organization's internal and external context, including its goals, culture, and stakeholder expectations.
4. Inclusive - Effective risk management involves the engagement of relevant stakeholders, improving awareness and ownership.

5. Dynamic and responsive to change - Risks evolve; risk management must continuously adapt to internal and external changes.
6. Best available information - Decisions should be based on reliable, timely, and relevant data, while acknowledging data limitations.
7. Human and cultural factors - Recognizing the role of behavior, values, and organizational culture is essential to managing risk effectively.
8. Continual improvement - Risk management should be reviewed and improved over time based on lessons learned and performance monitoring.

The risk management process outlined in ISO 31000 includes five sequential steps:

1. Risk identification
2. Risk analysis
3. Risk evaluation
4. Risk treatment
5. Monitoring and review, with communication and consultation integrated throughout.

Unlike other frameworks such as the COSO ERM Framework, which is heavily focused on internal controls, financial reporting, and corporate governance, ISO 31000 is broader and emphasizes decision-making culture, communication, and stakeholder engagement. This makes ISO 31000 particularly suitable for governments, NGOs, and development organizations operating in dynamic and uncertain environments—such as post-conflict or climate-vulnerable countries like Timor-Leste.

For example, in public administration, ISO 31000 helps embed risk thinking into strategic planning, policy design, public financial management, and disaster risk reduction. It encourages inter-agency coordination, transparent risk communication, and resilience planning. In 2023, the United Nations Office for Disaster Risk Reduction (UNDRR) and UNDP endorsed ISO 31000-based approaches in developing national and local risk governance frameworks for countries facing compound risks, such as climate-induced flooding, economic shocks, and food insecurity.

Moreover, ISO 31000's adaptability has made it widely adopted across sectors—from banking and energy to infrastructure and healthcare. Organizations in Timor-Leste, particularly those involved in public financial management, disaster risk governance, and infrastructure investment, can benefit from adopting ISO 31000 to increase transparency, improve decision-making under uncertainty, and ensure sustainable development.

Natural Resource and Fiscal Risk Management

The management of natural resources particularly oil, gas, and minerals present a double-edged sword for many developing economies. While resource wealth can provide substantial fiscal revenue and foreign exchange, it also introduces a distinct set of macroeconomic and governance risks. This phenomenon is captured by the well-known “resource curse” theory, first introduced by Auty (1993). The theory posits that countries rich in natural resources often suffer from economic volatility, weakened institutions, corruption, and underinvestment in non-resource sectors, ultimately hindering long-term development. Humphreys, Sachs, and Stiglitz (2007) expanded this view by highlighting how resource windfalls can erode democratic accountability, distort fiscal policy, and increase a country's exposure to external shocks such as price fluctuations in global commodity markets.

To mitigate the risks associated with natural resource dependence, many countries have established Sovereign Wealth Funds (SWFs) and implemented fiscal rules to promote intergenerational equity and macroeconomic stability. These funds typically serve two purposes: (1) smoothing revenue volatility caused by commodity price swings, and (2) saving for future generations

once the natural resources are depleted. A widely regarded model is Norway's Government Pension Fund Global, which uses strict withdrawal rules and a conservative investment strategy to ensure long-term sustainability.

Timor-Leste's Petroleum Fund, established in 2005, follows a similar logic and is often cited as a best-practice example among developing countries. The fund accumulates oil and gas revenues and finances the state budget through annual withdrawals, guided by the Estimated Sustainable Income (ESI) principle. This rule allows the government to withdraw only the amount that can be sustained over the long term without depleting the real value of the fund. As of 2024, the Petroleum Fund remains the main source of public financing, accounting for over 80% of the state budget (BCTL, 2024).

However, both the International Monetary Fund (IMF, 2023) and scholars such as Bauer (2013) caution that frequent and excessive withdrawals often above the ESI threshold undermine the fund's long-term viability. The Bayu-Undan oil field, which once contributed significantly to the fund, has ceased production, while the Greater Sunrise gas project remains stalled due to political and technical disputes. With no immediate alternative revenue source and sluggish progress in economic diversification, Timor-Leste faces increasing fiscal sustainability risks. Moreover, the limited development of non-oil sectors like agriculture, tourism, and manufacturing continues to restrict domestic revenue generation and job creation, deepening the country's reliance on a finite and volatile income stream.

To address these challenges, institutions such as the World Bank and IMF recommend strengthening fiscal rules, improving revenue forecasting, investing in domestic economic sectors, and enhancing public financial management. In addition, adopting medium-term expenditure frameworks (MTEFs) and expanding non-oil taxation are essential strategies to broaden the fiscal base. Without structural reforms, Timor-Leste risks falling into a "fiscal cliff" scenario, where future budget needs outpace fund returns and depletion accelerates.

Integrated Risk Management (IRM) and Climate Risk

In recent years, the understanding of risk has evolved beyond isolated categories to recognize its inherently multidimensional and interconnected nature. This shift is driven by the growing awareness of complex global challenges such as climate change, pandemics, and geopolitical instability, which do not respect sectoral boundaries and often produce cascading effects across social, economic, and environmental systems. To effectively address these compound and systemic risks, the concept of Integrated Risk Management (IRM) has gained traction, championed by international organizations including the United Nations Development Programme (UNDP, 2021) and the United Nations Office for Disaster Risk Reduction (UNDRR).

IRM moves beyond traditional siloed approaches by applying systems thinking to understand how risks interact and amplify each other. It promotes a holistic governance framework that coordinates actions across sectors such as finance, environment, health, infrastructure, and social protection. One of IRM's fundamental principles is cross-sectoral coordination, which ensures that risk reduction and response activities are aligned at all levels of government and society. For example, IRM encourages collaboration between ministries of environment, agriculture, finance, and health to develop coherent policies that recognize the interdependence of climate risks, food security, and fiscal stability.

Another critical component of IRM is the deployment of early warning systems (EWS) and risk mapping technologies. These tools enable timely identification of hazards—such as floods, droughts, and storms—that threaten communities and economies. By integrating meteorological data with socio-

economic vulnerabilities, governments can prioritize interventions and allocate resources more effectively. In Timor-Leste, where frequent flooding and droughts disrupt agriculture and livelihoods, investments in community-based EWS have proven valuable for reducing disaster losses and improving preparedness.

Investment in resilience-building and adaptive capacity is central to IRM. This includes strengthening infrastructure to withstand extreme weather, diversifying livelihoods to reduce economic exposure, and enhancing institutional capacity for flexible policy-making. The UNDP's Climate Resilience Framework underscores the importance of empowering local governments and communities to participate actively in risk governance, ensuring that adaptation measures are context-specific and socially inclusive. Timor-Leste's National Disaster Risk Management Policy (2023) aligns with these principles by emphasizing resilience in vulnerable regions and incorporating climate considerations into development planning.

Moreover, IRM advocates for the integration of climate and disaster risk financing into national fiscal management systems. This approach ensures that resources are available not only for immediate disaster response but also for long-term recovery and adaptation investments. Countries with limited fiscal space, such as Timor-Leste, benefit from risk pooling mechanisms, contingent credit lines, and insurance instruments designed to buffer against climate shocks.

3. Method, Data, and Analysis

This study employs a literature review methodology that systematically utilizes secondary data sources to explore and analyze the multifaceted risks and mitigation strategies relevant to Timor-Leste's economic context. The adoption of secondary data is widely recognized in social science and economic research as an effective approach, particularly when direct primary data collection is limited by accessibility constraints, resource availability, or when a comprehensive historical and contextual understanding is necessary (Johnston, 2017; Saunders et al., 2019).

In this study, secondary data refers to datasets and documented information originally collected for other purposes but pertinent to the current research objectives (Boslaugh, 2007). The research draws extensively on authoritative and credible documents, including official government reports, publications from international financial institutions, and national statistical compilations. Key sources encompass the Banco Central de Timor-Leste (BCTL) Economic Performance Report 2024, IMF Article IV Consultation Reports, the World Bank Development Indicators, and Timor-Leste's Annual Trade Statistics 2023. The triangulation of these diverse sources enhances the validity and reliability of the analysis, providing a multidimensional perspective on economic and fiscal risks (Flick, 2018).

The decision to adopt a qualitative-descriptive design grounded in literature review enables a nuanced and contextually rich exploration of risk management in Timor-Leste, where risk factors are complex and interwoven. This design supports the application of thematic content analysis to qualitative data, allowing for the identification and categorization of key risk themes such as fiscal vulnerabilities, environmental hazards, financial exposure, and operational challenges. Additionally, the approach integrates quantitative economic indicators to provide empirical support, yielding a comprehensive understanding that surpasses the limitations of purely empirical or experimental research designs (Creswell & Poth, 2017).

Data collection was carried out through systematic retrieval of relevant documents from institutional repositories, official websites, and verified databases. Criteria for source selection prioritized data recency (spanning 2018–2024), authority, and direct relevance to themes of economic

risk and fiscal management. Extracted information was carefully coded and organized into thematic categories corresponding to the identified risk domains.

For the analytical process, a thematic content analysis framework was employed, facilitating the extraction of patterns, relationships, and recurrent themes across the data corpus (Braun & Clarke, 2006). Complementing the qualitative insights, basic quantitative analyses were conducted, including the evaluation of fiscal sustainability measures such as the Estimated Sustainable Income (ESI) of Timor-Leste’s Petroleum Fund and the calculation of trade balance ratios. These quantitative assessments enriched the qualitative findings and allowed for a more holistic and robust evaluation of risk profiles (Neuman, 2014).

4. Result and Discussion

Current Market Volatility and Underlying Risks

Table 1: Key Risk Dimensions Affecting Timor-Leste’s Economy (2023–2024)

| Risk Category | Key Insights | Quantitative Evidence | Supporting Sources |
|---|---|--|---|
| 4.1.1 Macroeconomic Risks | - Real GDP growth improved from 2.4% (2023) to approx. 4% (2024). | GDP: ↑ 1.6% points | BCTL (2024); IMF (2024); World Bank (2024); Bauer (2013); Humphreys et al. (2007) |
| | - Inflation fell from ~8% to 2%. | Inflation: ↓ 6% points | |
| | - However, import dependence (food, energy) increases exposure to external shocks and keeps macroeconomic fragility high. | | |
| 4.1.2 Financial and Currency Risks | - Use of USD restricts monetary policy independence. | Dollarization limits Timor-Leste’s monetary tools | Ghosh et al. (2012); IndexMundi (2023) |
| | - Exposed to US interest rate changes. | | |
| | - Trade in IDR and AUD creates currency risk, especially with volatility in FX markets. | | |
| 4.1.3 Operational and Trade Disruption Risks | - Over 80% of goods are imported. | Imports ↑ from USD 820.8M (2023) → USD 923.2M (2024) = ↑ 12.5% | Timor-Leste Annual Trade Stats (2023); World Bank (2024); UNDP (2021) |
| | - High risk from supply chain disruptions and regional instability. | | |
| | - Leads to inflationary pressure and reduced productivity. | | |
| 4.1.4 Political and Regulatory Risks | - Weak legal enforcement, licensing delays, and budget execution inefficiencies. | Regulatory delays hinder FDI inflow and private sector growth | World Bank (2024); OECD (2020) |
| | - Limits FDI and constrains private sector development. | | |
| 4.1.5 Environmental and Climate Risks | - High exposure to floods, droughts, and soil erosion. | | UNDP (2021); ADB (2024); UNDRR (2020) |
| | - Over 60% of the population depends on agriculture. | >60% workforce in agriculture sector | |
| | - Threatens food security and economic stability. | | |

The economic risk landscape in Timor-Leste presents a complex web of interlinked vulnerabilities. Macroeconomic risks remain substantial despite a moderate recovery in real GDP growth from 2.4% in 2023 to approximately 4% in 2024, as reported by the BCTL Economic Performance Report (2024). Although inflation declined significantly from around 8% to 2% in the same period, the country's heavy reliance on imported food and energy continues to expose it to external price shocks. This structural dependence contributes to persistent macroeconomic fragility, a concern echoed in IMF and World Bank analyses (IMF, 2024; World Bank, 2024). Furthermore, the IMF Article IV Consultations (2024) raise alarms regarding fiscal sustainability, warning that continued withdrawals from the Petroleum Fund-amid falling oil revenues and weak domestic revenue mobilization-are unsustainable, reflecting broader fiscal constraints typical in resource-dependent economies (Bauer, 2013; Humphreys et al., 2007).

Financial and currency risks are amplified by Timor-Leste's use of the US dollar, which eliminates domestic control over monetary policy and exposes the economy to international financial shocks, such as those stemming from US Federal Reserve interest rate changes. This situation is consistent with the vulnerabilities faced by dollarized economies (Ghosh et al., 2012). Additionally, the country's reliance on trade with Indonesia and Australia, where transactions are conducted in Indonesian Rupiah (IDR) and Australian Dollar (AUD), introduces foreign exchange volatility risks. Reports such as those by IndexMundi (2023) confirm that fluctuations in these currencies have contributed to market instability.

Table 2: Imports of Goods-Countries of Origin

| | In millions of USD | | | Share (%) | |
|----------------------------|--------------------|--------------|-------------|------------|------------|
| | 2023 | 2024 | Var % Ano | 2023 | 2024 |
| Indonesia | 292.5 | 317.9 | 8.7 | 35.6 | 34.4 |
| China, Peoples Republic of | 122.8 | 138.4 | 12.7 | 15.0 | 15.0 |
| Singapore | 94.1 | 58.8 | -37.5 | 11.5 | 6.4 |
| Hong Kong | 20.5 | 24.8 | 21.2 | 2.5 | 2.7 |
| Viet Nam | 20.0 | 20.8 | 4.0 | 2.4 | 2.2 |
| Thailand | 12.1 | 20.8 | 72.4 | 1.5 | 2.3 |
| Australia | 14.9 | 22.7 | 52.9 | 1.8 | 2.5 |
| Malaysia | 29.5 | 21.1 | -28.5 | 3.6 | 2.3 |
| Japan | 11.5 | 16.8 | 46.4 | 1.4 | 1.8 |
| Brazil | 14.0 | 22.7 | 62.8 | 1.7 | 2.5 |
| Taiwan | 81.9 | 121.7 | 48.6 | 10.0 | 13.2 |
| India | 50.9 | 47.6 | -6.5 | 6.2 | 5.2 |
| Other | 56.4 | 89.1 | 58.0 | 6.9 | 9.6 |
| Total | 820.8 | 923.2 | 12.5 | 100 | 100 |

Source: INE-TL and BNCTL Calculation

The operational and trade disruption risks stem from Timor-Leste's significant dependency on imports, with over 80% of consumer and capital goods sourced from abroad, as highlighted by the Annual Trade Statistics (2023). This import dependence, combined with a limited domestic production base, renders the country highly vulnerable to international supply chain disruptions and regional geopolitical instability, which in turn can escalate domestic inflation and reduce productivity. Such conditions are commonly associated with fragile and low-capacity economies (World Bank, 2024; UNDP, 2021).

The analysis of Timor-Leste's import composition for 2023 and 2024 reveals a notable increase in the total value of imported goods, rising from USD 820.8 million to USD 923.2 million-an overall growth of 12.5%, indicating strong domestic demand despite efforts to strengthen local production. Indonesia remained the leading import source, accounting for 34.4% of total imports in 2024, although its share slightly declined from 35.6%, reflecting a modest diversification in trade relationships. China

held its position as the second-largest partner, with imports increasing by 12.7% and maintaining a 15% share, while Singapore experienced a sharp drop of 37.5%, reducing its share from 11.5% to 6.4%, possibly due to shifting trade preferences. Taiwan showed one of the most significant increases, rising by 48.6% and moving into third place with a 13.2% share, followed by notable increases from Australia and Brazil, both reaching 2.5% of total imports. Imports from “Other” countries also rose by 58%, now contributing 9.6% of total imports, alongside a 72.4% growth from Thailand, suggesting expanding trade networks. Conversely, Malaysia and India saw declines of 28.5% and 6.5%, respectively, while Japan’s imports grew by 46.4% though its share remained modest at 1.8%. Overall, while Indonesia and China continue to dominate, the data signals a clear trend toward greater trade diversification, with emerging partners like Taiwan, Brazil, Thailand, and Australia playing increasingly important roles in Timor-Leste’s external trade dynamics.

Compounding these economic vulnerabilities are political and regulatory risks, primarily driven by institutional inefficiencies. The World Bank (2024) highlights persistent regulatory challenges, such as delays in licensing processes, weak legal enforcement, and poor budget execution—all of which contribute to heightened investor uncertainty. These institutional gaps constrain private sector development and hinder the attraction of foreign direct investment (FDI), aligning with OECD and World Bank frameworks that stress the critical role of governance in economic stability and resilience (OECD, 2020; World Bank, 2024).

Lastly, environmental and climate risks constitute a growing threat to Timor-Leste’s socioeconomic fabric. Reports from the Asian Development Bank (ADB) and UNDP underscore the country’s exposure to climate-related hazards, including floods, droughts, and soil erosion. With over 60% of the population reliant on agriculture, extreme weather events not only jeopardize rural livelihoods but also endanger national food security and overall economic stability. These risks necessitate urgent and integrated climate resilience measures, consistent with international best practices in managing environmental vulnerabilities in fragile economies (UNDP, 2021; UNDRR, 2020).

Risk Management Strategies in Timor-Leste

In response to the complex and interconnected risks outlined, Timor-Leste must implement a comprehensive set of risk management strategies that combine immediate resilience-building measures with long-term structural reforms. Drawing on a robust literature review and secondary data analysis from credible sources—including the BCTL Economic Performance Report 2024, IMF Article IV Consultations, World Bank Development Indicators, and Timor-Leste Annual Trade Statistics 2023—this study identifies key strategic priorities aligned with thematic risk domains.

Table 3: Risk Management Strategies in Timor-Leste

| Strategic Area | Key Risks Addressed | Strategic Responses | Quantitative/Policy Rationale |
|---|---|---|---|
| 1. Fiscal Prudence & Petroleum Fund Sustainability | Fiscal instability, oil revenue decline | - Enforce ESI withdrawal rules | Prevents fund depletion, improves fiscal buffer. ESI = benchmark for sustainable withdrawals (BCTL, IMF 2024) |
| | | - Broaden tax base | |
| | | - Improve tax collection | |
| 2. Economic Diversification | Overreliance on oil sector | - Invest in non-oil sectors (agriculture, tourism, manufacturing) | Non-oil sectors had <5% investment (2022); coffee is |

| | | | |
|--|--|---|---|
| | Export vulnerability | - Promote coffee/fisheries value chains | top non-oil export (World Bank, 2024) |
| 3. Regulatory & Legal Reform | Low FDI, poor business environment | - Simplify licensing | WB/OECD: Legal bottlenecks impede FDI; regulatory clarity reduces transaction costs |
| | | - Improve contract enforcement & land titling | |
| | | - Increase transparency | |
| 4. Financial Sector Stability | Lack of credit access | - Develop domestic bond market | Local capital markets mobilize domestic funds; SME lending improves inclusion (IMF 2024) |
| | Financial exclusion | - Expand microfinance | |
| | | - Promote financial literacy | |
| 5. Climate Adaptation & Infrastructure Resilience | Floods, droughts, erosion | - Build resilient roads, irrigation, flood defenses | 60%+ workforce in agriculture; climate shocks affect food security (UNDP, ADB 2024) |
| | Infrastructure fragility | - Strengthen EWS | |
| 6. Supply Chain Risk Management | Import concentration, inflation, port inefficiencies | - Diversify import sources | Import growth 12.5% in 2024; diversification reduces inflationary shocks (INE-TL, Trade Stats 2023) |
| | | - Upgrade Dili Port logistics/customs | |

To ensure long-term fiscal sustainability, Timor-Leste must prioritize fiscal prudence and the responsible management of its Petroleum Fund. Central to this approach is strict adherence to the Estimated Sustainable Income (ESI) framework, which governs the limits of annual withdrawals from the Fund. This guideline, strongly emphasized in both the BCTL Economic Performance Report (2024) and IMF Article IV Consultations (2024), serves as a safeguard against fiscal instability. Moreover, reducing reliance on petroleum revenues through efforts to broaden the tax base and improve tax collection efficiency is critical. According to Bauer (2013) and Humphreys et al. (2007), robust domestic revenue mobilization not only supports sustainable public spending but also strengthens fiscal buffers in the face of commodity price volatility.

Complementing fiscal measures, economic diversification stands out as a strategic necessity. To reduce vulnerability stemming from oil dependence, Timor-Leste must invest in non-oil sectors such as agriculture, tourism, and light manufacturing. Development frameworks from the World Bank (2024) stress the importance of building productive capacity in sectors with export potential, notably coffee and fisheries. Encouraging value-chain development in these areas could enhance export earnings and contribute to inclusive, resilient growth. Creswell and Poth (2017) affirm that such diversification lowers economic exposure to external shocks and fosters broader social development.

In parallel, regulatory and legal reforms are essential for creating a conducive environment for private sector development. Simplifying business registration and licensing procedures can significantly enhance ease of doing business, while improvements in contract enforcement, land titling, and procurement transparency are crucial to reducing investor uncertainty. Reports from the World Bank (2024) and OECD (2020) indicate that weak regulatory frameworks impede foreign direct investment. Literature further supports that sound governance and legal clarity reduce transaction costs and foster economic stability (Saunders et al., 2019; Flick, 2018).

Strengthening the domestic financial sector is another critical pillar of risk management. Building a local bond market and expanding access to microfinance can mobilize domestic capital and increase financial inclusion for small and medium enterprises (SMEs). Additionally, promoting responsible lending practices and financial literacy among business owners is vital to reducing systemic financial vulnerabilities. These strategies, backed by insights from IMF reports and financial sector studies (Johnston, 2017; Neuman, 2014), can bolster resilience against economic shocks and encourage more sustainable credit practices.

Given the country’s high exposure to environmental risks, investments in climate adaptation and infrastructure resilience are indispensable. Upgrading physical infrastructure-including roads, irrigation systems, and flood defences-can significantly mitigate the impacts of natural disasters. Strengthening disaster preparedness and early warning systems also plays a crucial role in reducing socio-economic losses. These priorities align with the risk management principles championed by UNDP (2021) and UNDRR, and secondary data underscores the effectiveness of such investments in protecting vulnerable communities (Braun & Clarke, 2006).

Lastly, supply chain risk management must be prioritized to ensure economic continuity amid global disruptions. Timor-Leste should diversify its sources of imports to reduce dependency on a narrow range of trade partners. At the same time, logistical improvements-especially in critical nodes such as Dili Port-are necessary to alleviate bottlenecks and enhance customs efficiency. This approach reduces vulnerability to external shocks and inflationary pressures. Operational risk assessments and trade data analysis, as highlighted by Flick (2018), confirm that a resilient and diversified supply chain framework is vital for maintaining market stability.

Institutional Role in Risk Governance

Table 4: Institutional Role in Risk Governance

| Institution/Actor | Primary Roles in Risk Governance | Analytical Themes Identified | Supporting Sources |
|--|--|------------------------------|--|
| Ministry of Finance | - Fiscal policy formulation | • Fiscal sustainability | BCTL (2024); IMF (2024); WB (2024) |
| | - Oversight of Petroleum Fund | • Resource governance | |
| | - Revenue mobilization & expenditure control | • Revenue diversification | |
| Banco Central de Timor-Leste (BCTL) | - Macroprudential supervision | • Financial regulation | IndexMundi (2023); WB (2024); IMF (2024) |
| | - Banking sector stability | • Systemic risk monitoring | |
| | - Financial system resilience | • Liquidity management | |
| Chamber of Commerce | - Business representation | • Private sector inclusion | Saunders et al. (2019); WB (2024) |
| | - Dialogue on regulatory reforms | • Ease of doing business | |
| Civil Society Organizations (CSOs) | - Advocacy for transparency | • Social accountability | Flick (2018); UNDP (2021) |
| | - Community engagement | • Participatory governance | |
| Development Partners | - Technical assistance | • Multilateral cooperation | IMF; WB; UNDP; OECD (2020) |

| | | | |
|--|---------------------|-------------------------|--|
| | - Capacity-building | • Institutional support | |
| | - Reform financing | • Knowledge transfer | |

Effective management of market volatility in Timor-Leste fundamentally depends on coordinated institutional governance. This section draws upon a systematic literature review and secondary data analysis from authoritative sources—including the Banco Central de Timor-Leste (BCTL) Economic Performance Report 2024, IMF Article IV Consultations, World Bank Development Indicators, and Timor-Leste’s Annual Trade Statistics 2023—to delineate the key institutional roles and collaborative frameworks necessary for robust risk governance.

The Ministry of Finance holds primary responsibility for fiscal policy formulation and the sustainability of the Petroleum Fund, as underscored in multiple reports (BCTL, 2024; IMF, 2024). Its leadership role involves ensuring adherence to prudent fiscal rules, broadening revenue sources, and managing public expenditure to safeguard against commodity price shocks and fiscal instability. The ministry’s capacity to implement sound fiscal discipline is critical to maintaining investor confidence and overall macroeconomic stability.

Complementing fiscal stewardship, the Banco Central de Timor-Leste (BCTL) is tasked with overseeing macroprudential stability and banking sector regulation. The central bank’s mandate includes monitoring systemic financial risks, ensuring liquidity adequacy, and safeguarding the resilience of financial institutions. Literature and empirical data emphasize that strong banking oversight by BCTL is vital to buffering external financial shocks, especially given Timor-Leste’s dollarized economy and exposure to foreign interest rate fluctuations (IndexMundi, 2023; World Bank, 2024).

Beyond government agencies, the Chamber of Commerce, civil society organizations, and development partners play an indispensable role in fostering inclusive dialogue and collaboration for market-stabilizing reforms. Their engagement is crucial for improving the regulatory environment, advocating for transparency, and supporting private sector development. Development partners, including multilateral institutions, provide technical assistance, capacity-building, and financial resources that underpin reform initiatives. This multi-stakeholder coordination aligns with best practices in governance literature, which highlight the importance of participatory frameworks to enhance legitimacy and effectiveness in risk management (Saunders et al., 2019; Flick, 2018).

This institutional framework was identified through thematic content analysis of secondary data sources, enabling the extraction of recurrent governance themes across fiscal, financial, and operational risk domains (Braun & Clarke, 2006). The integration of qualitative insights with quantitative fiscal sustainability indicators further substantiates the imperative for clear institutional roles and collaborative mechanisms to navigate Timor-Leste’s economic vulnerabilities (Neuman, 2014).

Discussion

Timor-Leste’s economic outlook for 2023–2024 reflects moderate recovery, with GDP growth improving from 2.4% to approximately 4% and inflation easing from 8% to 2%. While these figures suggest stabilization, they mask critical structural vulnerabilities. As a small, open, and import-dependent economy, Timor-Leste remains acutely exposed to external shocks—including volatility in global commodity prices, particularly fuel and food (Hamilton, 2003; Baffes et al., 2015), foreign exchange fluctuations due to reliance on trade in IDR and AUD (Krugman & Obstfeld, 2018), and climate-related risks such as droughts and floods. The country’s persistent trade imbalance imports rising by 12.5% to USD 923.2 million in 2024 versus static exports of roughly USD 200 million further

amplifies inflationary pressures and underscores the nation's dependence on external markets (Timor-Leste Annual Trade Statistics, 2023). Although trade partner diversification (e.g., increased imports from Taiwan, Thailand, and Brazil) shows progress, the overarching reliance on imported essentials reflects continued fragility. Moreover, the use of the U.S. dollar, while shielding domestic currency value, limits monetary flexibility and subjects the economy to imported financial shocks a common vulnerability among dollarized economies (Ghosh et al., 2012).

To mitigate these interrelated risks, the adoption of a multidimensional and integrated risk management strategy is essential. According to Behl et al. (2023) and Knight (1921), sound risk governance involves distinguishing measurable risks from deeper uncertainties an approach especially pertinent to Timor-Leste's fiscal and environmental challenges. First, fiscal prudence must be restored by enforcing the Estimated Sustainable Income (ESI) rule for withdrawals from the Petroleum Fund (BCTL, 2024; IMF, 2024). As Bauer (2013) and Humphreys et al. (2007) argue, failure to manage resource windfalls sustainably often leads to fiscal erosion and weakened institutions. Economic diversification remains an equally pressing priority. Developing agriculture, tourism, and manufacturing sectors coupled with value chain development in coffee and fisheries can reduce reliance on oil revenues and foster more inclusive growth (World Bank, 2024; Creswell & Poth, 2017). Meanwhile, legal and regulatory reforms such as streamlined business registration, improved contract enforcement, and transparent procurement can attract foreign direct investment and enhance private sector dynamism (OECD, 2020; Saunders et al., 2019). On the financial front, expanding access to microfinance, nurturing a domestic bond market, and improving financial literacy are key to boosting financial inclusion (Johnston, 2017; Neuman, 2014). Simultaneously, addressing environmental vulnerability through investment in climate-resilient infrastructure, early warning systems, and irrigation will improve disaster preparedness and agricultural productivity (UNDP, 2021; UNDRR, 2020).

However, even the best-formulated strategies require robust institutional governance to succeed. This analysis supported by Braun & Clarke's (2006) thematic framework highlights that the success of Timor-Leste's risk response depends heavily on institutional coordination and capacity. The Ministry of Finance holds a central role in fiscal governance and must enforce prudent budget execution aligned with long-term sustainability goals. The Banco Central de Timor-Leste (BCTL) provides a financial safeguard through its macroprudential oversight and banking regulation particularly vital in a dollarized environment lacking independent monetary policy. Furthermore, stakeholders such as the Chamber of Commerce, civil society organizations, and international development partners contribute significantly by enhancing transparency, providing technical assistance, and promoting participatory reform. Nonetheless, fragmentation across government institutions and a lack of cohesive inter-ministerial collaboration hinder effective policy execution. Literature emphasizes the need for integrated governance mechanisms; thus, the establishment of a National Risk Coordination Council or a similar body would be instrumental in streamlining responsibilities, aligning national priorities, and reinforcing institutional accountability (Flick, 2018; World Bank, 2016). Ultimately, Timor-Leste must move toward a proactive, inclusive, and data-driven model of risk governance to transition from vulnerability to resilience.

5. Conclusion and Suggestion

Timor-Leste's exposure to market volatility is deeply rooted in its structural economic dependencies, limited diversification, and environmental fragility. The findings of this study

underscore the multidimensional nature of the risks the country faces-including macroeconomic instability, fiscal vulnerability, overreliance on the Petroleum Fund, weak regulatory capacity, and high susceptibility to climate-related shocks. Drawing from a robust literature review and secondary data-including the BCTL Economic Performance Report (2024), IMF Article IV Consultations, World Bank Development Indicators, and the 2023 Annual Trade Statistics this study offers a holistic assessment of the current risk landscape and response capacity.

To navigate these vulnerabilities, the implementation of a coherent and forward-looking risk management strategy is imperative. This strategy must be grounded in fiscal prudence particularly through disciplined Petroleum Fund withdrawals aligned with the Estimated Sustainable Income (ESI) benchmark and in broader revenue generation through improved tax administration. Moreover, economic diversification is essential to reduce the nation's overdependence on oil revenues and imports. Promoting growth in agriculture, tourism, and light manufacturing sectors will help build economic resilience and generate sustainable employment.

Simultaneously, enhancing the investment climate through legal and regulatory reforms such as simplifying licensing, improving land titling systems, and strengthening transparency can unlock private sector potential and attract long-term capital. Strengthening the financial sector, particularly through the development of microfinance institutions and improved financial literacy, is also crucial to enabling inclusive growth and mitigating financial risks.

Environmental and operational risks must be addressed through targeted investments in climate-resilient infrastructure, supply chain diversification, and improved national preparedness systems. These measures are vital to protect livelihoods, particularly in rural and vulnerable communities, from extreme weather and logistical disruptions.

Finally, strong institutional coordination remains the foundation of effective risk governance. The Ministry of Finance must lead in fiscal consolidation and budget execution, while the Banco Central de Timor-Leste (BCTL) must ensure macro-financial stability. Collaboration with civil society, the private sector, and international development partners will be key to designing and implementing reforms that are both technically sound and socially inclusive.

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