# An empirical analysis of factors that influence informal cross-border money payments in the SADC region

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## Abstract

### Background

*The subject of how financial funds, both formal and informal, flow across international borders from a developed functional payments system to an underdeveloped system, vice versa, remains understudied. One wonders if the magnitude of some undeclared transactions that cross borders has any significance on lost GDP in the short term or long term? Most studies have largely been qualitative in nature, which presents an empirical gap that this study aims to fill quantitatively by focusing on SA and its neighboring countries, where few studies exist on this topical yet understudied topic. There is a void in understanding the factors that influence informal cross-border money payments in the SADC region. What is known mostly are studies that have focused on Cross Border Electronic Commerce (CBEC) from formal payments cross-border systems from a developed country. But what is unknown is the factors that drive the usage from an informal cross-border perspective in a situation where one economy has a developed payments system surrounded by small economies with poor, underdeveloped systems.*

### *Study novelty or contribution*

*This study's novelty stems from focusing on the factors that drive businesses to informalize cross-border transactions. Could it be a response to overregulation on the part of the South African Reserve Bank or other unknown reasons?*

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***Research methods***

*The study aims to solve the problem using stylized economic transactions by combining stylised economic facts, descriptive statistics, and a Poisson Pseudo Maximum Likelihood (PPML) gravity modelling approach, which examines the determinants of informal cross-border trade across six SADC countries neighbouring South Africa.*

***Results***

*A positive and significant relationship exists between the consumer price index and ICBT across all the models, except (1) and (5), which supports the hypothesis that inflation pushes trade into informal channels. Also, the mixed pattern observed across different model specifications underscores the complex relationship between recorded trade volumes and informal flows. In contrast, the variable for unemployment displays a strong negative and statistically significant coefficient in all models, with values from negative 0.356 to negative 0.600. The findings also highlight the spatial dimension, with the estimated coefficient for distance being negative and statistically significant in most model specifications. Furthermore, All six measures exhibit a negative and statistically significant association with informal cross-border trade.*

***Policy implication***

*Governments should prioritise institutional reforms that enhance transparency, streamline customs procedures, and reduce bureaucratic obstacles to decrease incentives for informal trade. Moreover, regional cooperation should be strengthened to harmonise trade policies and improve cross-border infrastructure, thereby reducing the transaction costs associated with geographical distance. Ultimately, creating a predictable, efficient, and business-friendly formal trading environment represents the most sustainable strategy for integrating informal trade into the formal economy, increasing tax revenues, and promoting deeper regional economic integration.*

***Keywords****: Informal Cross-Border Trade, Governance Indicators , Poisson Pheudo Maximum Likehoood method (PPML), SADC*

## INTRODUCTION AND BACKGROUND

South Africa (SA) has a relatively developed international payments system that can detect any suspicious international movement of funds. However, when considering other Southern African Development Community (SADC) bordering countries, there are notably poor and underdeveloped, if not isolated, financial systems. Could it be perhaps one of the reasons some businesses find it difficult to do business in SA and resort to doing business in other SADC economies with poor or underdeveloped clearing systems, which allow them to move money informally across their borders and avoid the SA and the world‘s clearing systems? One wonders if the magnitude of such undeclared transactions has any significance on lost GDP in the short term or long term? It does not necessarily imply that moving money informally implies there is an element of illegality in the transaction; however, the cumbersome process and bureaucracy may make it unattractive to move money formally across borders. This calls for an empirical understanding of some of the factors that prompt businesses to resort to informal cross-border payments, an area that has attracted few studies, yet holds significance in the academic community.

Previous studies by Zetzsche, Anker-Sørensen, Passador, and Wehrli (2021) used content analysis focusing on the European market. The study focused on the initial analysis of the legal challenges related to digital-based cross-border payment arrangements. On the other hand, Cui (2025) employed a qualitative content analysis of Southeast Asia, utilizing a meta-analytical approach. However, Nguyen, Nguyen, and Tran (2024) used structural equation modeling and partial least squares to analyze the Vietnamese Cross-Border Electronic Commerce (CBEC) and found that a holistic view from management assisted in understanding the factors that promoted informal cross-border e-commerce. In contrast, Chen, Lan, and Chang (2023) conducted a systematic literature review on CBEC, applying it to 40 CBEC studies using the Stimulus-Organism-Response (S-O-R) framework to gain a better understanding of the CBEC ecosystem. Additionally, Prasad (2021) focused on the Indian informal cross-border market, using stylized economic facts to gain a better understanding of CBEC.

The subject of moving funds across borders from a developed payments system to an underdeveloped payments system, vice versa, remains shrouded in mystery.

Though there is a temptation to assume something illegal is happening, it opens to further questioning. In this respect, there is a void in understanding the factors that influence informal cross-border money payments in the SADC region. What is known mostly are studies that focus on CBEC from formal cross-border payment systems in developed countries. However, what is unknown is the factors that drive usage from an informal cross-border perspective in a situation where one economy has a developed payments system surrounded by small economies with poor, underdeveloped systems. This creates an empirical gap that this study aims to close in the SADC region, where few studies exist.

The novelty of this study lies in its focus on the factors that drive businesses to informalize cross-border transactions. Could it be a response to overregulation on the part of the South African Reserve Bank or other unknown reasons? Naturally, countries that share borders have strong trade ties, but one wonders how funds are flowing to and from economies with collapsing financial systems in the SADC region. This study seeks to provide insight into informal cross-border payments in the SADC region. It addresses this issue by combining stylised economic facts, descriptive statistics, and a Poisson Pseudo Maximum Likelihood (PPML) gravity modelling approach, which examines the determinants of informal cross-border trade across six SADC countries neighbouring South Africa, subject to data availability.

Specifically, the study aims to answer the following research questions

- What are the factors that influence the use of informal cross-border payments in the SADC region?
- What is the contribution of informal cross-border payments to GDP in the SADC region?

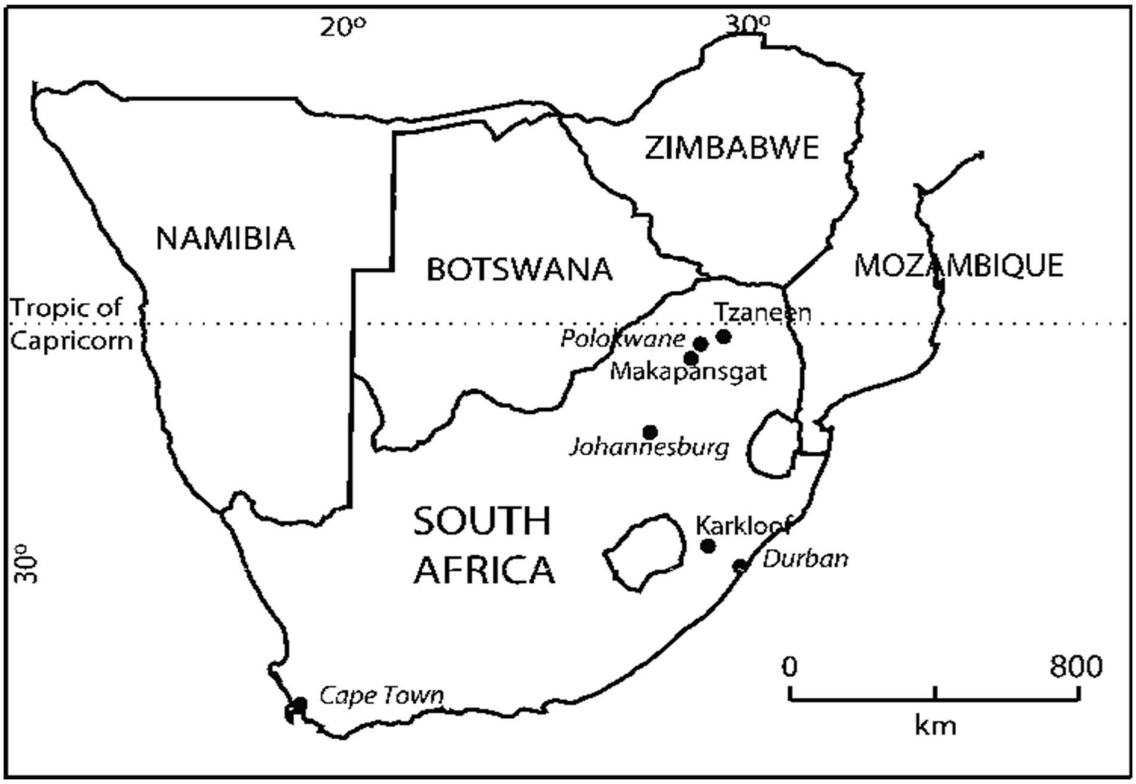
The research addresses these questions by applying the PPML gravity model to panel data, incorporating macroeconomic variables, business environment indicators, geographical distance, and governance measures. This approach allows for robust estimation of the determinants of informal cross-border trade while accounting for heteroskedasticity and zero trade flows. The rest of the paper is as follows: Section 2 presents the review of literature, which is followed by the methods. Thereafter, the results and analysis follow a discussion and analysis of results. The paper concludes with a conclusion and policy implications.

## REVIEW OF LITERATURE

*Overview of the SA and its neighbors' payment system*

Figure 1 shows South Africa (SA)'s neighbors are Botswana, Namibia, Lesotho, Eswatini, Mozambique, and Zimbabwe, whereby the virtue of SA's economic size accounts for more than 60% of trade within the SADC region (Statistics South Africa, 2023). There are considerable movements of funds between SA and its neighbors, either formally or informally.

**Figure 1:** *Countries that share a border with SA*




Source: Google Maps (2025)

Table 1 presents the existing laws governing e-commerce transactions between South Africa and its neighboring countries. We observe that mostly e-commerce-related legislation is non-existent or still a draft legislation, with only SA, Mozambique, and Botswana having binding laws that govern e-commerce transactions. However, progress has been made in getting cybercrime-related criminal legislation across most countries, except for Namibia, where such legislation does not exist, and Eswatini, which has a draft law in existence only.

**Table 1**: *The status of E-Commerce and cross-border legislation in the select SADC countries*

| Country | E-Commerce-related legislation exists | Cybercrime-related legislation exists | Law |
|---|---|---|---|
| Botswana | Yes | Yes | National ICT Policy of 2018-2022 |
| Eswatini | No | Draft | National ICT Policy of 2019-2022 |
| Lesotho | Draft | Yes | National ICT Policy of 2016-2021 |
| Mozambique | Yes | Yes | National strategy for the development of information and communication technologies of 2018-2022 |
| Namibia | Draft | No | National ICT Policy of 2016-2021 |
| South Africa | Yes | Yes | South African National E-Commerce Strategy |
| Zimbabwe | Draft | Yes | National Policy for ICT and the SMART Zimbabwe 2030 Masterplan |

Source: Thiebant (2024); UNTAD

*Preliminary statistics and trend analysis*

Table 2 presents some summary statistics from the SADC region by focusing specifically on countries that border South Africa. The purpose is to get an understanding of whether the business model followed by the country has any linkage to the informal sector size, population size, and internet penetration.

**Table 2**: *Summary statistics from select SADC countries*

| | Population in 2024 (Millions) | Informal sector size (%) | Contribution to GDP (%) | Business model [4] | Internet penetration (%) |
|---|---|---|---|---|---|
| Botswana | 2,5 | 28,5 | 5,3 | B2B | 81,4 |
| Eswatini | 1,24 | 60 | 39,1 | B2C | 57,6 |

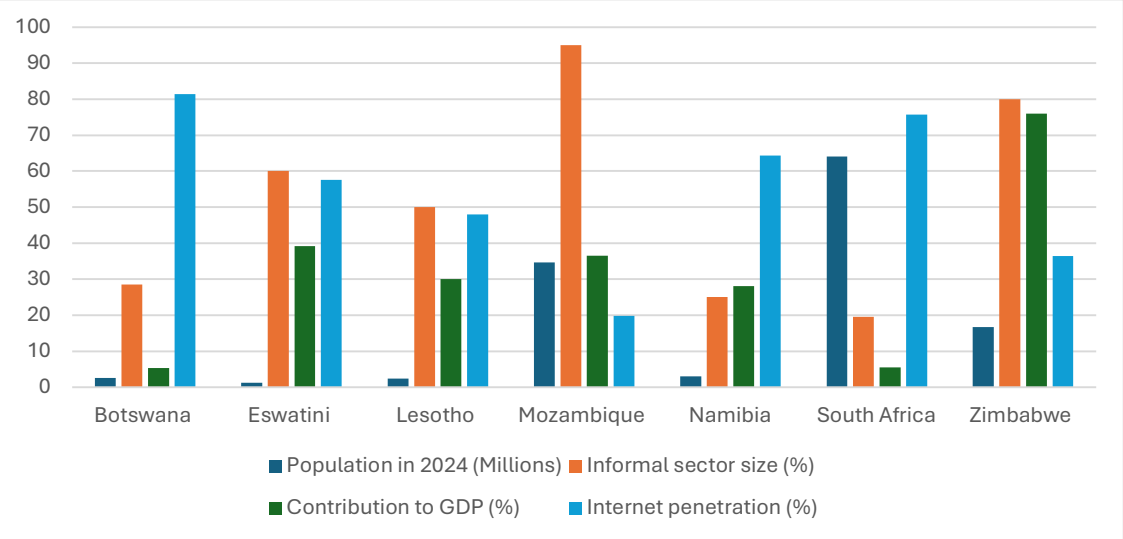
[4] B2B stands for business-to-business, B2C is for business to consumer, C2C stands to consumer to consumer

| | | | | | |
|---|---|---|---|---|---|
| Lesotho | 2,37 | 50 | 30 | B2C | 48 |
| Mozambique | 34,63 | 95 | 36,5 | C2C | 19,8 |
| Namibia | 3,03 | 25 | 28 | B2C | 64,4 |
| South Africa | 64,01 | 19,5 | 5,5 | B2B | 75,7 |
| Zimbabwe | 16,63 | 80 | 76 | C2C | 36,4 |

Source: own compilation from World Bank Stats

From the table, we see a situation in which countries with a high internet penetration, like Botswana and South Africa, lean towards a B2B model, which makes it easier for the central bank to regulate the payment system, and also, mostly, the informal businesses are contributing less than 6% in both nations, implying most transactions go via the formal system. However, countries like Mozambique, with a 95% informal sector size, have more consumer-to-consumer (C2C) business models that are mainly cash-based, which makes it difficult to regulate. Also, the same can be said of Zimbabwe, where 80% of transactions are in the informal sector, accounting for 76% of GDP. The same information is also presented in Figure 3.

**Figure 3**: *Summary of SADC countries' simplified facts*

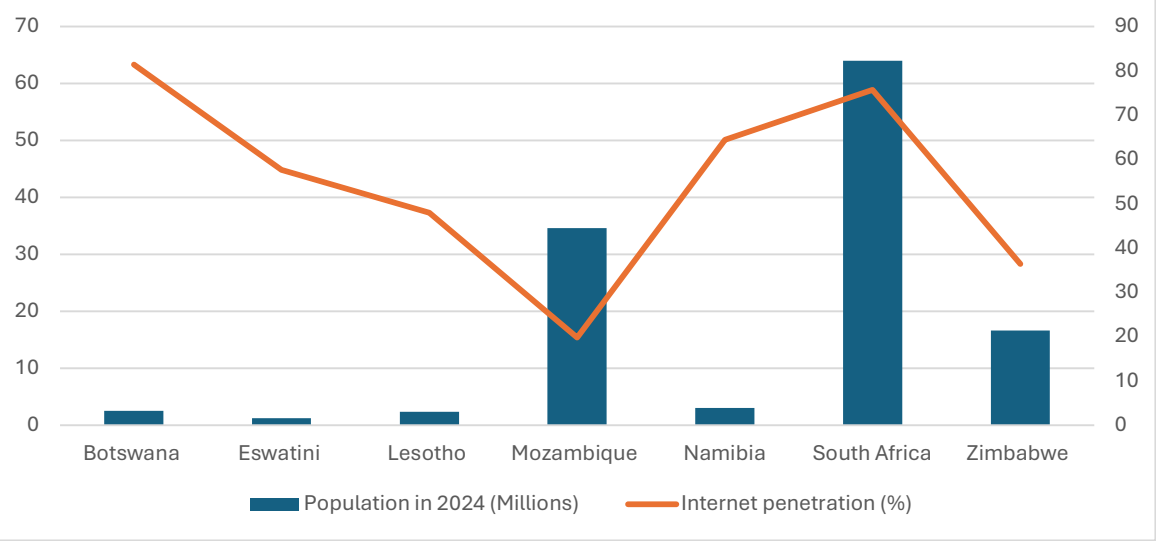



Source: author's compilation

Figure 4 is a representation of a link between internet penetration and the population. What has been observed is that for small SADC economies with a population of less than 5 million people, they have more than 40% internet penetration, as network service providers can literally service everyone. This implies that Fintechs that ride on

network infrastructure can take advantage to push banking services. But if we look at nations that have a low internet usage, like Mozambique, possibly due to years of political instability and civil war that destroyed most infrastructure, the usage of C2C makes sense, and most transactions are cash-based and informal. One wonders how payments move formally between SA, which has B2B and Mozambique using C2C? That remains unclear, and some of the reasons are outside the scope of this study.

Figure 4: *Select SADC countries: Population vs internet penetration*




*Theoretical Literature*

According to Botha and Makina (2011), financial regulation and supervision have traditionally followed an institutional approach in which institutional payment systems are regulated on the basis of functional lines. But, with time, SA has moved towards a consolidated approach, having observed the expanded scope that a traditional institutional approach would not handle. On the other hand, SA follows a supervisory approach driven by observing market and international trends, which is significantly different from that of its neighbors, suggesting that its neighbors employ a more reactive approach, primarily driven by crisis lines. Lately in SA, the multi-sector regulatory approach has enveloped several sectors into one. In proximity, a time research gap is observed, as this analysis mostly dates to 2011. Can the same be said to be true post the COVID-19 pandemic of 2021/2022, where cross-border e-commerce became a necessity and the volumes went up as people and businesses learned to adapt to working from home? Also, only trucks moving goods were allowed

across borders, yet cash and e-commerce increased, both using legit and informal ways post the pandemic, outside the scope of the central bank's regulatory system. It should be borne in mind that the more transactions move out of official systems, the more the revenue gap on the part of the tax authorities results in expanded budget deficits, a feature common in most SADC countries.

As posited by McCallum and Aziakpono (2023) the concept of a regulatory sandbox can be borrowed in the regulation of informal cross-border payments. Here, there is a collaboration between the central banks acting as payments regulators in most instances and market participants that include Fintechs and the broader traditional banking participants. It is dynamic in nature in that the changing market conditions determine the overall shape that it takes. Furthermore, the sandbox approach reduces the time and costs between market participants and enhances decision-making across borders. But it should be noted that not all countries are at the same level in terms of technological development. In some economies, there is an infrastructural void to operate the sandbox framework. Also, the regulatory sandbox falls short of having an implementation structure.

Also, there is existing literature that traces the SADC model law as alluded to by Chimeri and Shumba (2025), who offer insights into this law, in which the law is found to govern electronic transactions and electronic commerce. But it should be noted that there has been the greatest challenge of non-existent binding obligations by member states that overlap across borders. Furthermore, member states can implement the law voluntarily in their nations. This is especially problematic in the SADC financial ecosystem, where SA is a willing participant in implementing the law. It remains unclear the level of commitment of other nations. These are some of the reasons that remain problematic in crafting universally agreed laws that are only legally binding within the country, yet the magnitude of financial transactions can cross borders.

Lastly, SA has evolved from the institutional regulatory system in the 1980s towards a multi-sectoral regulatory system that envelops several sectors into one (Mhlongo, Kunjal, & Muzindutsi, 2025). One wonders if the SARB and its neighboring central banks are sufficiently capacitated to deal with Fintechs-related payments related to informal payment systems that are constantly innovating at a faster pace, which operate outside the scope of central bank payments regulation, despite taking over

banking functions, yet remain unregulated. Furthermore, as observed in Table 2, the absence of e-commerce legislation in SA's neighboring countries is a problem, as this creates a moral hazard issue in which cross-border transactions tend to drift towards informalization to evade the regulatory oversight of central bank payments systems. Whenever a mismatch exists between innovation and regulation, it encourages the drifting of legitimate cross-border payment systems towards informal channels to avoid tax issues. By implication, SA is thereby shunned as it raises alarm on transactions that otherwise can slip undetected into other economies.

*Empirical Literature Review*

Bansah and Mohsin (2023) did a study that traced the relationship between ICBT and inflation using 156 countries of which 50 were developed and 106 were developing. They found that inflation would increase with the informalization of transactions where most participants had little or no access to credit. However, Spanjers and Foss (2015) in another study using data from 2008-2012 noted that illicit flow of funds have a 1.355% increase in financial development of which, with efficiency in regulation, illicit funds tend to reduce. On the other hand, Mirfatah, Nasrollahi, Levine,& Gabriel, (2019) found that GDP has a stabilizer effect on ICBT and that monetary policy was less effective where the informal economy was high. Whereas, Khayati, & Terzi, (2023) found that a large informal financial system had a positive influence on economic growth at the 1% level of significance. Also, Kim, Payne, Yang-Hood, Li, Davis, Carlquist, & Rutherford (2019) noted that there is a significant negative influence of distance on ICBT. Whereas, Wu, Hon-Wei, Yang, Muda, & Xu, (2023) used GMM and found that inflation has a negative influence on unemployment using panel data from selected Asian countries.

Most studies [5] done so far have largely been qualitative in nature and applied content analysis; the only departure was the studies by McCallum and Aziakpono (2023) and Bekbossinova et al. (2022) both applied mixed methods. According to their findings, the regulatory sandbox lacks the necessary implementation muscle to regulate financial flows across borders. Also, these studies mostly focused on the South African market. Despite, Bekbossinova et al. (2022), noting that the rural poor are still

[5] McCallum and Aziakpono (2023), Bekbossinova, Oshanova, Khassenova, Alpysbayeva, and Moldasheva (2022), Botha and Makina (2011), Gondwe (2022), and Chitimira and Torerai (2024)

excluded from financial inclusion, a moral hazard problem is created in this instance. Could this be the basis for FinTechs having to rapidly innovate to cut operating costs and reach as many customers as possible, even in the traditionally unbanked clients? This remains unexplored, but this study won't focus much on that.

Furthermore, other studies were conducted by Chitimira and Torerai (2024) using content analysis, in which it was noted that people in Sub-Saharan Africa still prefer cash as opposed to plastic money, but slowly, mobile money is replacing this, albeit with degrees of suspicion from the aging population that still prefer to physically hold cash to be satisfied that it is money. Also, the study noted that there exists no legislation in SA to regulate mobile money transactions, though FICA and RICA[6] offer hope of combating illegal transactions using mobile money. However, it should be noted that those in the telecommunications space are delving into the money payment system traditionally reserved for banks and rapidly innovating ahead of the regulator, thus creating opportunities for themselves and challenges of compliance and monitoring on the part of the central bank. Could this be a basis where the SA Reserve Bank is accused of heavy-handedness on the movement of funds across borders, thus scaring away even legitimate business as they try to stem the tide of illicit drug money, money laundering, and all financial malfeasance that flows across borders through unregistered means?

In contrast, Rapanyane and Ngoepe (2020) unpack the impact of illicit financial flows on the country's governance from a thematic content analysis perspective. Similarly, Reuter (2012) traces the illicit outflow from the developing countries to the developed countries. A phenomenon common amongst ill-gotten spoils hidden mostly in offshore accounts in obscure island destinations, as they jump from one account to another in concealing the identity of the source of the funds. Not to say keeping money in an offshore account is illegal, but when it is concealed to avoid paying tax, then that

[6] RICA refers to the Regulation of Interception of Communications and Provision of Communication-Related Information Act (Act 70 of 2002), which is an act that mandates that the identity of users and their addresses are, by law, verified and registered when registration of SIM cards to prevent serious crime and allow for lawful interception of communications under strict legal conditions. However, it should be noted that people buy over-the-counter already mass-registered sin cards, which they buy and discard after engaging in nefarious activities. On the other hand, the Financial Intelligence Centre Act 38 of 2001(FICA), is a law that was designed to combat financial crimes like money laundering, fraud, tax evasion, and terrorist financing, where financial institutions are required to verify and keep up-to-date customer information and report any untoward activities to authorities

becomes worrying. Anything that is legal needs to pass the legitimate test and can be verified by the central banker with ease. It is this understanding that the SA Reserve Bank is shunned upon as it complies with international payments standards, of which this may not be the case with its neighbors. However, by virtue of sharing a border, there are obvious trade ties, both legal and illegal, that must be settled, which unfortunately cannot all be monitored by the Reserve Bank.

Departing from using content analysis, Weber et al. (2019) and Mhlongo et al. (2025) used quantitative methods in exploring the impact of Fintech's innovation in the banking sector. Of which it was observed that FinTechs do not necessarily enhance bank performance as traditional banking is still preferred in less developed countries. The case in SA presents a situation where some banks prematurely closed their branches as they switched to telephone and internet banking. However, the reality is that the clientele was clogging the few remaining branches and still preferred going to the branch for services that could be completed in the comfort of their own homes. It is this reality that banks are forced to reopen and revert to traditional banking, as the population is largely suspicious of telephonic scams that are common in the country, making it difficult to distinguish between a legitimate telephone call from the bank and a scammer. How do banks now balance the need to remain profitable when faced with handling large amounts of cash that have little profit margin in their portfolio? That remains a headache to the banks, yet they still need to remain afloat and assure the customer that their money is safe with them.

In a study to examine the potential of cross-border e-Commerce in Africa, Thiébaut (2024) used a multi-dimensional mixed method and raised cash on delivery as a preferred method of payment between neighboring countries in conducting cross-border transactions. The problem with cash transactions is that they make it difficult for the central bank to understand the source of the funds, some of which come from questionable sources. In support, Nakayama (2022), noted that the porous borders between Southern Africa Development Community (SADC) neighbors encourage the informalization of cross-border transactions. Contextual analysis of the Zimbabwe situation, in which mostly transactions are either in cash or using mobile money transactions that use the ECONET wireless network. Yet its neighbor, SA, has most major transactions that are conducted via formal banking systems that can be monitored. However, these two neighbors enjoy strong trade ties. This raises the

question of how businesses that operate formally between these two countries can move funds, an issue that remains unclear to the SARB. Also, it remains unclear if significant transactions are being moved across mobile money platforms between neighboring SADC countries.

On the other hand, Derindağ (2022) noted that the COVID-19 pandemic of 2021-2022 ended up presenting opportunities for innovation in the e-commerce space. This improved the rapid switching to digital platforms to manage local and regional transactions in the world and the SADC region. Furthermore, platforms like cryptocurrency and the use of Bitcoins have become increasingly popular since they eliminate the problem of currency conversion. However, there are still elements of measured reluctance in their usage, given that they are prone to speculative risks or abuse of investment funds by those who start them. One wonders if some of these Bitcoin investments are not another Ponzi scheme waiting to collapse. In contrast, Chitimira and Torerai (2024), found that the SADC model law adopted in 2012 to harmonize regulatory and payments systems under the AfCFTA framework has not achieved its goal, more than 10 years after its inception. The lack of universal laws across borders presents challenges in that one country can be compliant with internationally acceptable standards, yet other neighboring countries choose to drag their feet and circumvent a neighbor that follows laws by the book.

In summary, several studies have focused on the payment systems in several countries, helping spell out if there is a difference in the payment systems in the countries bordering SA, as spelled out in Table 1.

Table 2: Summary Literature Review of Approaches of National Payment Systems

| | **Authors** | **Time/place** | **Methodology** | **Findings** |
|---|---|---|---|---|
| 1 | Ayodele (2023) | SA | Mixed methods applying content analysis plus descriptive statistics | Rural poor are still excluded, cautious the excitement in financial inclusion, as it creates a moral hazard problem |
| 2 | Botha and Makina(2011) | SA | Content Analysis<br>-Silo institutional approach<br>-Integrated Approach<br>-Functional Approach<br>-Twin Approach | -SA started as an institutional approach and developed into a functional approach in 1980<br>-It is driven now along the international lines |
| 3 | McCallum and Aziakpon (2023) | SA | -regulatory sandbox used in FinTechs and was launched in 2020<br>-Using triangulation in Mixed methods(Interviews plus content analysis ) | -The regulatory sandbox fell short of having an implementation structure |

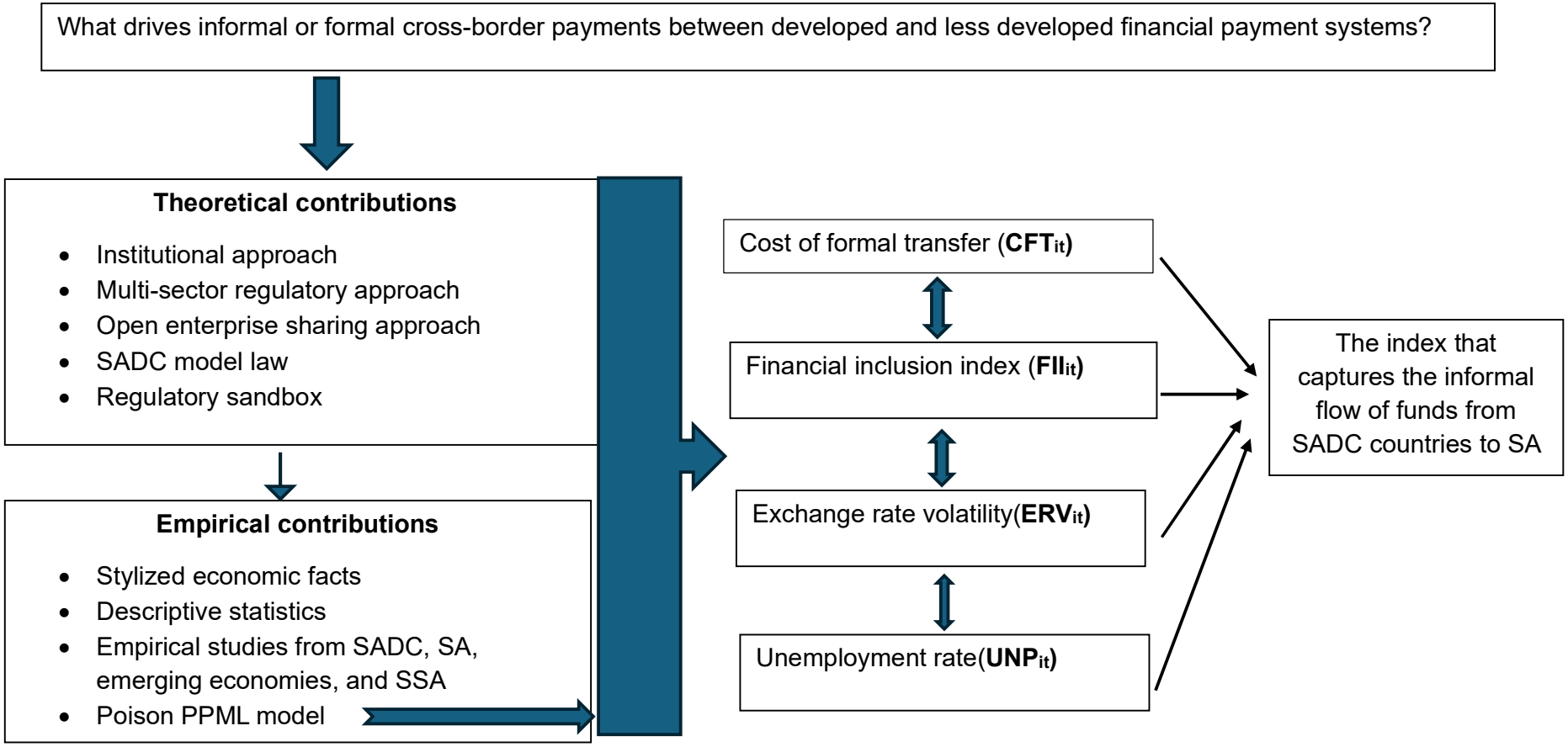
| | | | | |
|---|---|---|---|---|
| 4 | Mhlongo, Kunjal and Muzindutsi (2025) | SA, 2000-2023 | QUANT using panel regression to explore the impact of Fintech innovation in banking sector competition and performance<br>- Use of the lerner index capital adequacy ratio | -FinTechs enhance competition through mobile transactions, but they do not improve bank performance, as traditional structures still exist |
| 5 | Gondwe (2021) | SA | QUAL | Focus on the supervisory frameworks of financial co-operatives, which are overregulated |
| 1 | Chitimira and Torerai (2021) &2024 | ZIM | Content Analysis | -The use of mobile banking technologies<br>-Traditional banking is losing pace at the innovation speed of the mobile network providers, outside the scope of the Reserve Bank<br>-Mobile money presents low-cost money savings and increased reach<br>-In 2024, the same authors found that there exists no legislation that regulates mobile money transactions, which opens the scope for the usage of mobile networks to move illicit money,<br>- |

| | | | | |
|---|---|---|---|---|
| 1 | Rapanyane and Ngoepe (2019) | SA | Thematic content analysis | The purpose was to unpack the impact of IFRS illicit financial flows (IFFS) on the country's governance and development |
| 2 | Reuter (2012) | Several countries | Content analysis and descriptive statistics | -The book traces the illicit outflow of money from developing countries to developed countries |
| 3 | Weber et al (2019) | | Logistic regression and the random forest method | -Cryptocurrency has introduced a complication to the regulator as criminals increasingly use it to move ill-gotten spoils across borders Despite being risky, it is popular in the underground cross-border payment method |

**Source:** Authors' compilation

Figure 2 presents the conceptual framework that this study follows, where the paper traces the theoretical contributions and empirical contributions. Furthermore, the logistic model variable choice is presented.

**Figure 2**:*Conceptual framework to be adopted in this study*



## METHODS

*Descriptive statistics*

The descriptive statistical analysis was conducted to show a broad overview of the profile of the model variables in the study (Wegner, 2017) while simultaneously providing the panel data set description and summary. The mean (average) and the coefficient of variation representing measures of central tendency and measures of dispersion were employed in this study.

Table 3: *Descriptive Statistics*

| Variable | Statistics | Botswana | Lesotho | Mozambique | Namibia | Zimbabwe | Eswatini |
|---|---|---|---|---|---|---|---|
| ICBT | Mean | 0,541 | 0,105 | 0,333 | 0,354 | 0,777 | 0,568 |
| | CV | 0,043 | 0,117 | 0,091 | 0,086 | 0,034 | 0,009 |
| LNCPI | Mean | 5,025 | 5,039 | 5,155 | 5,029 | 6,549 | 5,033 |
| | CV | 0,009 | 0,011 | 0,014 | 0,009 | 0,094 | 0,007 |
| LNEVE | Mean | 4,679 | 4,548 | 4,755 | 4,650 | 4,819 | 4,533 |
| | CV | 0,014 | 0,008 | 0,009 | 0,011 | 0,011 | 0,005 |
| LNGDPPC | Mean | 8,877 | 6,958 | 6,323 | 8,449 | 7,527 | 8,230 |
| | CV | 0,003 | 0,004 | 0,007 | 0,004 | 0,011 | 0,002 |
| LNMVOI | Mean | 4,477 | 4,415 | 4,457 | 4,391 | 4,560 | 4,666 |
| | CV | 0,011 | 0,012 | 0,011 | 0,012 | 0,007 | 0,007 |
| LNNBR | Mean | 9,516 | 7,727 | 8,174 | 7,100 | 9,588 | 7,871 |
| | CV | 0,013 | 0,008 | 0,006 | 0,012 | 0,013 | 0,005 |
| LNUE | Mean | 3,055 | 3,014 | 1,402 | 3,001 | 1,868 | 3,259 |
| | CV | 0,007 | 0,019 | 0,064 | 0,007 | 0,051 | 0,018 |
| LNDIST | Mean | 5,892 | 6,198 | 6,260 | 5,903 | 6,973 | 5,986 |
| | CV | - | - | - | - | - | - |
| PS | Mean | 1,033 | -0,228 | -0,920 | 0,626 | -0,814 | -0,345 |
| | CV | 0,012 | -0,241 | -0,122 | 0,059 | -0,054 | -0,111 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| RQ | Mean | 0,595 | -0,543 | -0,685 | 0,001 | -1,551 | -0,453 |
| | CV | 0,043 | -0,063 | -0,057 | 29,959 | -0,035 | -0,136 |
| RL | Mean | 0,429 | -0,353 | -0,994 | 0,347 | -1,348 | -0,454 |
| | CV | 0,038 | -0,103 | -0,029 | 0,068 | -0,021 | -0,087 |
| VA | Mean | 0,462 | 0,040 | -0,468 | 0,541 | -1,170 | -1,313 |
| | CV | 0,023 | 0,440 | -0,088 | 0,030 | -0,020 | -0,021 |
| CC | Mean | 0,732 | -0,145 | -0,800 | 0,243 | -1,305 | -0,396 |
| | CV | 0,035 | -0,501 | -0,031 | 0,082 | -0,012 | -0,182 |
| GE | Mean | 0,368 | -0,847 | -0,814 | 0,137 | -1,268 | -0,651 |
| | CV | 0,074 | -0,055 | -0,039 | 0,208 | -0,012 | -0,073 |

CV stands for coefficient of variation, Authors' computations

The descriptive statistics for the SADC countries that share a border with South Africa (SA) are presented in Table 3. The linearised values of EVE (export volume index), NBR (new business registered), GDPPC (gross domestic product per capita), MVOI (import volume index), and UE (unemployment), among others, will be considered. Zimbabwe has the highest average ICBT with respect to the informal flow of funds for imports from other SADC countries into South Africa. That is, Zimbabwe's ICBT (0.777) surpasses its counterparts and has relatively lower variability as indicated by the coefficient of variation (CV) of 0.034. However, Lesotho's ICBT (0.105) is the lowest, indicating the most unstable situation among the SADC countries under consideration, as indicated by the respective CV (0.117). Zimbabwe also experienced the highest average inflation rate (LNCPI: 6.649), depicting the highest level of uncertainty through the highest CV of 0.094 as compared to other SADC countries neighbouring South Africa. Moreover, these SA neighbouring countries, Zimbabwe included, recorded the highest averages of LNEVE (4.819) and LNNBR (9.588) for Zimbabwe, LNGDPPC (8.877) for Botswana, LNMVOI (4.666) and LNUE (3.259) for Eswatini, with relatively lower variability, which also applies to other SADC countries in the study, with respect to governance indicators, Botswana and Namibia appeared to be performing better than their counterparts, Lesotho, Mozambique, Zimbabwe, and Eswatini, although governance indicator fluctuations remain a concern according to the CV statistics shown in Table 3.

*Econometric model*

Informal cross-border payments are conceptually linked to informal cross-border trade (ICBT) and both are latent constructs. Previous studies have focused on ICBT because it is comparatively easier to approximate than informal cross-border payments (Bouët et al. 2020; Lesser and Moisé-Leeman 2009; Peberdy and Crush 2017). Approaches in the literature include census-based surveys, estimation techniques and econometric modelling (African Union 2024). This study adopts the econometric approach and applies a gravity modelling framework.

The gravity model of trade, which explains bilateral flows through economic size and distance, forms the basis of this analysis. To capture South Africa's dominant regional influence without modelling its internal economy, the study excludes it as a direct participant. Instead, South Africa's "gravitational pull" is represented by the distance from Pretoria to the capitals of six neighbouring SADC countries: Botswana, Eswatini, Lesotho, Mozambique, Namibia, and Zimbabwe. This allows us to assess the determinants of ICBT in these countries while accounting for South Africa's overarching influence. The general relationship is specified as:

$$ICBT_{it} = f(CPI_{it}, EVOL_{it}, MVOL_{it}, GDPP_{it}, NBR_{it}, UE_{it}, DIST, PS_{it}, RQ_{it}, GE_{it}, RL_{it}, VA_{it}, CC_{it}, U_{it}) \quad \cdots\cdots\cdots (1)$$

where $i$ denotes country $i$, $t$ denotes year $t$, and $U_{it}$ captures unobservable factors. Adopting a log-linear specification for the macroeconomic and business variables (so that coefficients can be interpreted as elasticities) while keeping ICBT and governance indices in levels, the empirical model is expressed as:

$$ICBT_{it} = LNCPI_{it} + LNEVOL_{it} + LNMVOL_{it} + LNGDPP_{it} + LNNBR_{it} + LNUE_{it} + LNDIST_{it} + Gov_{it} \cdots\cdots (2)$$

where $Gov_{it}$ represents a governance indicator for country $i$, in year $t$. To address potential autocorrelation, the six governance indicators were introduced separately during estimation. These include Political Stability (PS), Regulatory Quality (RQ), Government Effectiveness (GE), Rule of Law (RL), Voice and Accountability (VA), and Control of Corruption (CC).

## *Definition of variables*

The ICBT index is constructed from the import volumes of countries sharing a border with South Africa. A defining characteristic of these six neighbouring countries is their

reliance on South Africa as their primary trading partner. Nevertheless, the index should be regarded as a crude proxy for informal cross-border trade, as it is based on reported import figures that also include trade with countries other than South Africa. ICBT is estimated using the formula:

$$\boldsymbol{ICBT_{it} = \frac{GDP\ in\ Country\ i, year\ t - Imports\ of\ Country\ i, year\ t}{GDP\ in\ Country\ i, year\ t}} \cdots\cdots (\mathbf{3})$$

The intuition behind equation (3) is that the numerator (GDP less Imports) represents the share of GDP not explained by recorded imports. Dividing this by GDP yields a ratio that approximates the proportion of the economy potentially accounted for by domestic production together with unrecorded (informal) trade.

Table 4 presents the descriptions of the variables used in the econometric model.

**Table 4**: *Variable descriptors*

| Variable code | Variable explanation | A priori sign | Source |
|---|---|---|---|
| $ICBT_{it}$ | The index that captures informal flow of funds from SADC countries to SA and other countries. | Dependent variable | WBI (2025) |
| $LNCPI_{it}$ | is log of consumer price index in SADC country $i$, year $t$ | Positive | WBI (2025) |
| $LNEVOL_{it}$ | is log of export volume index in SADC country $i$, year $t$ | Negative | WBI (2025) |
| $LNMVOL_{it}$ | is log of import volume index in SADC country $i$, year $t$ | Positive | WBI (2025) |
| $LNGDPP_{it}$ | is log of GDP per capita in SADC country $i$, year $t$ | Positive | WBI (2025) |
| $LNNBR_{it}$ | is log of new business registered index in SADC country $i$, year $t$ | Positive | WBI (2025) |
| $LNUE_{it}$ | is log of total unemployment in SADC country $i$, year $t$ | Positive | WBI (2025) |
| $LNDIST_{it}$ | is log of distance from capital Pretoria to the capital city of SADC country $i$, year $t$ | Negative | WBI (2025) |
| $PS_{it}$ | Political stability and absence of violence/terrorism index in SADC country $i$, year $t$ | Negative | WBI (2025) |
| $RQ_{it}$ | Regulatory quality index in SADC country $i$, year $t$ | Negative | WBI (2025) |
| $GE_{it}$ | Governance effectiveness index in SADC country $i$, year $t$ | Negative | WBI (2025) |
| $RL_{it}$ | Rule of law index in SADC country $i$, year $t$ | Negative | WBI (2025) |
| $VA_{it}$ | Voice and accountability index in SADC country $i$, year $t$ | Negative | WBI (2025) |
| $CC_{it}$ | Control of corruption index in SADC country $i$, year $t$ | Negative | WBI (2025) |

## EMPIRICAL RESULTS AND DISCUSSION

Table 5 presents the empirical results generated from our econometric approach. The analysis employs a Poisson Pseudo Maximum Likelihood (PPML) estimator, which is preferred for gravity models due to its consistency in the presence of heteroskedasticity and its ability to incorporate zero-valued trade flows, thereby avoiding the bias inherent in standard OLS estimation. The regression results, detailed in Table 4, exhibit high goodness-of-fit, with $R^2$ values ranging from 0.69 to 0.81, indicating the model successfully captures the primary determinants of ICBT in the SADC region.

Table 5: Results with the dependent variable $ICBT_{it}$

| **MODEL** | **[7]** | **[8]** | **[9]** | **[10]** | **[11]** | **[12]** |
|---|---|---|---|---|---|---|
| **VARIABLES** | **ICBT** | **ICBT** | **ICBT** | **ICBT** | **ICBT** | **ICBT** |
| | | | | | | |
| **LNCPI** | 0.0144 | 0.120*** | 0.0627* | 0.0704** | 0.0360 | 0.0923** |
| | (0.345) | (3.698) | (1.656) | (2.184) | (1.029) | (2.248) |
| **LNEVE** | -0.0128 | -0.0534 | 0.193 | 0.333* | 0.0699 | -0.0790 |
| | (-0.0799) | (-0.239) | (1.069) | (1.808) | (0.362) | (-0.322) |
| **LNGDPPC** | 0.872*** | 0.715*** | 0.826*** | 0.618*** | 0.694*** | 0.785*** |
| | (6.481) | (7.770) | (6.679) | (6.720) | (7.100) | (5.855) |
| **LNMVOI** | 0.0998 | 0.272 | -0.0869 | -0.486** | 0.185 | 0.319 |
| | (0.403) | (1.116) | (-0.355) | (-2.131) | (0.784) | (1.146) |
| **LNNBR** | 0.154*** | 0.283*** | 0.105** | 0.111** | 0.213*** | 0.120*** |
| | (3.472) | (5.297) | (2.489) | (2.508) | (4.562) | (2.623) |
| **LNUE** | -0.452*** | -0.587*** | -0.356*** | -0.490*** | -0.389*** | -0.600*** |
| | (-4.198) | (-5.373) | (-3.191) | (-4.597) | (-3.581) | (-4.316) |
| **LNDIST** | -0.274 | -1.663*** | -0.873*** | -0.346** | -0.847*** | -0.584*** |
| | (-1.606) | (-6.832) | (-4.990) | (-2.426) | (-4.464) | (-2.803) |
| **PS** | -0.654*** | | | | | |
| | (-6.268) | | | | | |
| **RQ** | | -1.018*** | | | | |
| | | (-8.920) | | | | |
| **RL** | | | -1.027*** | | | |
| | | | (-7.537) | | | |
| **VA** | | | | -0.515*** | | |
| | | | | (-9.936) | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **CC** | | | | | -0.798*** | |
| | | | | | (-8.232) | |
| **GE** | | | | | | -0.673*** |
| | | | | | | (-4.374) |
| **Constant** | -6.611*** | 0.972 | -3.102*** | -3.120*** | -3.370*** | -4.692*** |
| | (-5.366) | (0.746) | (-3.018) | (-3.003) | (-2.768) | (-3.119) |
| **Observations** | 72 | 72 | 72 | 72 | 72 | 72 |
| **R-squared** | 0.735 | 0.756 | 0.764 | 0.806 | 0.763 | 0.691 |

Robust z-statistics in parentheses:

*** p<0.01, ** p<0.05, *

p<0.1

*Discussion*

The findings in Table 4 reveal that the coefficient estimates show distinct influences of the determinants over ICBT. A positive and significant relationship exists between the consumer price index and ICBT across all the models, except (1) and (5), which supports the hypothesis that inflation pushes trade into informal channels. For example, in Model (2), the coefficient on the log of the consumer price index (LNCPI) is 0.120 and is significant at the one per cent level. This means that a one per cent increase in the consumer price index is associated with an approximately 0.12 unit increase in the ICBT index, holding other factors constant. Similarly, GDP per capita is also a positive and highly significant driver, consistent with theoretical expectations. Again, in Model (2), a one per cent increase in GDP per capita is associated with a 0.715 unit increase in the ICBT index, ceteris paribus. The magnitude and significance of this effect suggest that rising income levels in neighbouring SADC countries strongly stimulate informal cross-border trade.

On the other hand, export volumes and import volumes are largely insignificant across the models. Both variables attain significance in Model (4). The coefficient on export volume is positive and significant at the 10 per cent level, which suggests that increases in recorded exports are associated with higher levels of informal cross-border trade. This may reflect complementarities between formal export activity and informal flows, where networks established through formal trade also facilitate informal transactions. By contrast, the coefficient on import volume is negative and significant at the five per cent level, indicating that higher levels of recorded imports are linked to lower levels of ICBT. This finding points to a possible substitution effect, whereby

greater availability of goods through formal import channels reduces the incentive for traders to rely on informal mechanisms. The mixed pattern observed across different model specifications underscores the complex relationship between recorded trade volumes and informal flows.

Regarding the business environment variables, the results show a positive and significant correlation between the rate of new business entry and informal cross border trade (ICBT) in every model. The coefficient, which ranges from 0.105 to 0.283 and is consistently statistically significant, indicates that stronger entrepreneurial activity is linked to higher levels of informal trade. This implies that new firms may sometimes utilise informal channels to source cheaper inputs or access regional markets more flexibly, especially in situations where formal trade is hindered by regulatory burdens and high costs.

In contrast, the variable for unemployment displays a strong negative and statistically significant coefficient in all models, with values from negative 0.356 to negative 0.600. This finding suggests that higher unemployment rates suppress engagement in ICBT. A plausible explanation is that successful informal cross border trade depends on a certain level of resources, business networks, and mobility, which unemployed people are less likely to possess. Therefore, instead of serving as a survival strategy for the jobless, ICBT in this setting seems to be an undertaking that demands entrepreneurial initiative and existing economic engagement, making it more viable where employment is higher.

The findings also highlight the spatial dimension, with the estimated coefficient for distance being negative and statistically significant in most model specifications. This measure is calculated from Pretoria to the capital cities of the neighbouring SADC countries. The finding aligns with a core principle of gravity modelling that trade flows diminish with greater distance, a result of rising transport and transaction costs. The coefficients, which range from negative 0.346 to negative 1.663, demonstrate that geographical separation has a considerable suppressing effect on informal cross border trade.

The results underline the spatially constrained character of ICBT, showing that proximity to South Africa supports informal trading networks by lowering logistical barriers and reducing the risks of detection at borders. Conversely, when the distance

is greater, the cost of informal exchange rises, and its appeal diminishes. These findings underscore the vital importance of geographical proximity in facilitating informal trade. They also validate the model's use of Pretoria as the reference point, confirming South Africa's dominant role as the region's principal trading partner.

Lastly, the results for the six governance indicators convey a clear and consistent pattern. All six measures exhibit a negative and statistically significant association with informal cross-border trade. This robust finding indicates that strong governance, characterised by effective regulation, political stability, rule of law, accountability and control of corruption, substantially reduces reliance on informal trading channels. The evidence suggests that in contexts where these institutional dimensions are weaker or less predictable, economic agents are more likely to engage in informal cross-border trade as an alternative. These results underscore that the quality of a country's institutional framework is a fundamental determinant of ICBT activity, with weaker governance acting as a catalyst for informal trade.

## CONCLUSION AND RECOMMENDATIONS

### *Conclusions*

This study confirms the applicability of the gravity model for analysing informal cross-border trade within the SADC region and highlights the complex interaction of economic, spatial, and institutional determinants. The empirical results demonstrate that informal cross-border trade is not a peripheral activity but is systematically influenced by macroeconomic conditions, entrepreneurial dynamics, and the quality of governance. The significant negative coefficient for distance from Pretoria underscores South Africa's role as the regional economic hub around which informal trade flows are organised.

Several key conclusions can be drawn from the analysis. First, informal cross-border trade is closely linked to formal economic activity. It is stimulated by higher GDP per capita and increased new business formation, while high unemployment constrains participation. This suggests that informal cross-border trade frequently functions as an entrepreneurial response rather than as a coping mechanism for the unemployed. Second, the consistently negative and significant associations with all six governance indicators, which include Political Stability, Regulatory Quality, Government Effectiveness, Rule of Law, Voice and Accountability, and Control of Corruption,

provide strong evidence that informal trade is primarily an institutional phenomenon. Weaker governance is associated with higher levels of informal trade, indicating that businesses and individuals resort to informal channels when formal institutions are perceived as inefficient, corrupt, or burdensome.

*Recommendations*

Based on these findings, several policy recommendations are proposed. Governments should prioritise institutional reforms that enhance transparency, streamline customs procedures, and reduce bureaucratic obstacles to decrease incentives for informal trade. Simplifying registration processes and lowering the costs of formal cross-border compliance could encourage entrepreneurs to operate within formal channels. Moreover, regional cooperation should be strengthened to harmonise trade policies and improve cross-border infrastructure, thereby reducing the transaction costs associated with geographical distance. Ultimately, creating a predictable, efficient, and business-friendly formal trading environment represents the most sustainable strategy for integrating informal trade into the formal economy, increasing tax revenues, and promoting deeper regional economic integration.

*Limitations and areas for future studies*

This study contributes to a deeper understanding of the determinants of informal cross-border trade while also identifying promising avenues for further investigation. One limitation concerns the reliance on aggregate data, which does not allow for a detailed exploration of the individual motivations and strategies adopted by traders. Future research could therefore employ mixed-method approaches, combining econometric modelling with qualitative techniques such as trader surveys and interviews, to uncover the micro-level decision-making processes that underpin the use of informal channels. Another valuable direction would be to disentangle the relative effects of the six governance indicators, with particular attention to whether specific dimensions of institutional quality, for example control of corruption compared to regulatory quality, exert greater influence on the extent of informality. Comparative analyses across African regional economic communities would also be useful to establish whether the observed patterns are unique to the SADC context or are more broadly generalisable. In addition, given the increasing importance of digital platforms

in trade, future studies should consider the evolving role of mobile money services and social media in shaping and transforming informal cross-border trade networks.

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