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AN APPLICATION OF THE LATENT DIRICHLET ALLOCATION MODEL:
The Southern African Development Community and the Paris Club

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Abstract

In the mid-20th century, several supranational organisations came into existence to address the desire for strong human rights and the rule of law. Countries in the Global South, particularly those from Southern Africa, sought to advance their national political liberation through supranational efforts, hence the birth of the Southern African Development Coordination Conference (SADCC), which eventually became the Southern African Development Community (SADC). The SADC, with its Vision 2050, aims to promote peace and security sustenance as socioeconomic transformation in Southern Africa. However, while the SADC functions to operate in a collaborative fashion, member states have struggled with achieving debt sustainability. In response, the Paris Club, an informal organisation of creditor countries, created innovative debt relief solutions for indebted countries. These solutions are referenced in the Paris Club's archives, which is the central data source for this study. To derive insights from these archives, this study utilised the Latent Dirichlet Allocation (LDA) model to thematically analyse the Paris Club's archives targeted towards SADC member states. The results from this study substantiate the Paris Club's role in facilitating debt restructuring efforts, such as debt service suspensions, when interacting with the SADC, particularly prioritising the debt sustainability of Angola, the Democratic Republic of Congo, Seychelles, and Zambia.

Key words: *Paris Club, Southern African Development Community, debt restructuring, topic modelling, Latent Dirichlet Allocation*

Introduction

Popularised by Albert Einstein in the late 1940s, a supranational organisation refers to an international union that exercises some authority generally reserved to states (Helfer & Slaughter, 1997). Einstein believed that a supranational organisation could lead to peace and security (Zaharia & Pozneacova, 2020). Stirring much discussion and consideration, supranationalism gained influence in regions such as the Western Hemisphere through the Council of Europe. This supranational organisation, founded in 1949, places an emphasis on strong human rights and the rule of law. As is the case with other intergovernmental organisations, the Council of Europe is a proponent of the enforcement of various international agreements serving in its interest (*The Role of the Council in International Agreements*, 2024). Pursuant to the above, the Council of Europe was created to safeguard and promote common interests through shared principles and both economic and social progress.

In the same time frame as the establishment of the Council of Europe, there was a propagation of other supranational unions (and contributing ideologies) forming outside the Western Hemisphere, such as in the global south. In Africa, for example, there were distinct ideologies represented by three groups: (1) the Casablanca Group, (2) the Brazzaville Group, and (3) the Monrovia Group. The Casablanca Group supported the political unionisation of African countries, while the Brazzaville Group favoured a looser association of independent states based on economic, social, scientific, and technical cooperation (Billmaier, 2020). On the other hand, the Monrovia Group advocated for collaboration among African states without pursuing political federation or integration (Billmaier, 2020). The Organisation of African Unity (OAU), founded in 1963, was established in Addis Ababa, Ethiopia, as a comprehensive solution to these different viewpoints. Thirty-two African governments were part of the founding body of the OAU. The purpose of the organisation was to achieve the following in accordance with the OAU Charter of 1963 (article II) (*Encyclopaedia of African American Society*, 2005):

- Promote unity and solidarity among African states;
- Protect their sovereignty, territorial integrity, and independence;
- Exterminate all forms of colonialism in Africa;
- Coordinate and intensify their cooperation and efforts to improve the standard of living in Africa; and
- Promote international cooperation in terms of the principles of the UN Charter and the Universal Declaration of Human Rights.

The OAU directly addressed issues of decolonisation, trade, and economic development. The Council of Ministers set the agenda for annual meetings to define and coordinate the policy of the OAU, and engaged in emergency sessions as needed. In spite of the ambitions of the OAU, the organisation ultimately did not manifest its original ambitions. Attributable by some to the “materialistic and opportunistic character of African politics,” a more enduring explanation lies in its lack of institutional architecture to scale its continental aspirations (Berman, 1998, 305). This is partly attributed, by some scholars, to the primacy of political power in relation to the elite and apathy towards African unity from political leadership in Africa (Ake, 1981; Ibeike-Jonah, 2001). These various factors inhibited the OAU’s ability to create institutional capacity in an enduring manner. As time progressed, a hunger for coordinated instruments of policy amongst different nation-states persisted. The OAU, thus, evolved into the African Union, an organisation formed in 1999 with the aim of facilitating enhanced cooperation and unity amongst African countries. Presently, the African Union is respected for its contributions in spurring political stability and economic development across its member states.

The OAU and the African Union are two supranational organisations inspired by mainstream ideologies, including Pan-Africanism and African Nationalism. Pan-Africanism calls for the solidarity of those of African descent. The belief’s intention is to amplify the power in Africa and beyond through the amalgamation of resources capable of challenging conventional standards in the Americas. Leaders of Pan-Africanism include Toussaint Louverture, Henri Christophe, Kwame Nkrumah, and Robert Mugabe, among other highly respected individuals. On the other hand, African nationalism is rooted in national self-determination, playing a vital role in the decolonisation of Africa occurring from the mid-1950s to 1975. Events like the Mau Mau Rebellion and the Algerian War took place at this time. In both of these cases, there was conflict between European rule and an African nation, a historical recurrence as evidenced by events such as the Scramble for Africa and the Anglo-Zulu War. In response to European colonial rule and the desire for independence, some African nations unionised their efforts through events like the Southern African Development Coordination Conference (SADCC), which was established in 1980 by nine independent African member states. This conference is intended to advance national political liberation in Southern Africa through the active collaboration of its members. As a mechanism of economic integration, the SADCC abided by four principles pursuant to its founding statement, the Lusaka Declaration of 1980: (1) reduction of member state dependence, (2) amplified network cohesion and engagement, (3) mobilisation of resources, and (4) concerted action to form international partnerships (*History and Treaty*, 2024). In this context, the SADCC fortified its presence in international affairs by charting pathways for equitable development by embracing sectoral responsibility, which consequently had the potential to minimise South Africa’s hegemony (Hwang, 2007). In spite of this ambition, SADCC states enhanced their economic reliance on South Africa, a country that currently provides linkage to Western

markets and multinational corporations (Hwang, 2007). The SADCC's propensity for sectoral responsibility paved the way for political harmonisation in recognition of the autonomy of engaged countries to coordinate in several areas, such as transportation and communication, attempting to detach from the formation of a supranational system of cooperation. In theory, such an approach could facilitate managerial inconsistencies amongst member states that signed the Lusaka Declaration of 1980 (Hwang, 2007). In practice, however, the national interest of the engaged parties of the SADCC commanded a shared preservation of individualism, diminishing its administrative power. The increased allure of amity between member states catalysed the SADCC to evolve into a new organisation.

Methodology

This study utilises an LDA using packages in Python, including *gensim*, *pdfplumber*, *nltk*, and *os* to derive insights from the Paris Club's archives with documents published between 2001 and 2024. One condition of the chosen documents in this study is that their title must explicitly refer to the full name of a member state of the SADC. Mauritius, Zimbabwe, and the Kingdom of Eswatini are excluded from this study as they do not meet the aforementioned criterion. There are a total of 42 documents included in this analysis, wherein hyperparameters are fixed at 5.

Southern African Development Community Overview

During a meeting in Harare, Zimbabwe, in 1992, regional heads of governments reached consensus via the SADC Treaty to transform the SADCC into the Southern African Development Community (SADC), an intergovernmental organisation headquartered in Gaborone, Botswana, founded to integrate the economic development of its members. The SADC Treaty focused on regional integration in a manner that could contribute to Southern Africa's economic growth via poverty alleviation and the enhancement of the quality of life for its citizens. The treaty established several institutional mechanisms that helped formalise the intergovernmental organisation. Some of these mechanisms include a tribunal, a secretariat, a standing committee of officials, and a summit of heads of state or government. In an effort to restructure the SADC, the SADC Treaty Amendment of 2001 was enacted to address issues that arose during the transition from the SADCC to the SADC, forming eight institutions through the guidance of Article 9 of the amendment. The amendment also established the Regional Indicative Strategic Development Plan (RISDP), a document that reflects many efforts to clarify the SADC's initiatives and projects. The SADC has achieved several notable accomplishments since its founding in 1992, some of which are briefly listed below with their corresponding year of occurrence:

- Establishment of the Southern Africa Power Pool (SAPP): 1995
- Establishment of the Regional Energy Regulators Association (RERA): 2002
- SADC Signing of the Memorandum of Understanding on Regional Cooperation and Integration with the Common Market: 2009
- Creation of the SADC Industrialisation Strategy and Roadmap (2015 - 2063): 2015
- Membership of the Union of Comoros: 2018
- Approval of SADC Vision 2050 and the RISDP 2020 - 2030: 2020

In addition to the Union of Comoros, other member states include Angola, Botswana, the Democratic Republic of Congo, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, the United Republic of Tanzania, Zambia, and Zimbabwe.

To operationalise the SADC's success, its members created a Vision 2050 document, which is complementary to the United Nations' 2030 Agenda for Sustainable Development and the African Union's Agenda 2063. The vision rededicates the supranational organisation to peace and security sustenance as well as socioeconomic transformation. The document asserts that its vision is to actualise a "peaceful, inclusive, competitive, middle- to high-income industrialised region, where all citizens enjoy sustainable economic well-being, justice and freedom." The priorities of SADC's vision are represented by three pillars: (1) industrial development and market cohesion, (2) infrastructure development in support of regional integration, and (3) social and human capital development (SADC, 2020). More information on these pillars are briefly included below:

- **Pillar 1: Industrial Development and Market Integration:** Promote a competitive and facilitative environment that transforms and ultimately enhances macroeconomic stability and convergence.
- **Pillar 2: Infrastructure Development in Support of Regional Integration:** Produce quality and interconnected infrastructure and networks, emphasising increased accessibility to infrastructure and services.
- **Pillar 3: Social and Human Capital Development:** Reinforce the relationship between economic growth and sustainable human development, with the overall ambition to ameliorate poverty altogether.

Current and Historical SADC Macroeconomic Performance

While the aspirations of SADC are now clear, it is helpful to understand the organisation's current and historical macroeconomic performance. As of 2022, the gross domestic product (GDP) of SADC was approximately 812 billion USD (derived from data used to construct Figure 1). As depicted in the pie chart below, South Africa constitutes 49.9% of GDP amongst

the SADC in 2022, followed by Angola (13.2%), Tanzania (9.3%), and the Democratic Republic of Congo (8.0%). On the other hand, Lesotho (0.3%), Seychelles (0.2%), and Comoros (0.2%) make up the three smallest percentage shares of GDP amongst the SADC, respectively, and are negligible in value in comparison to other countries (Figure 1).

Figure 1

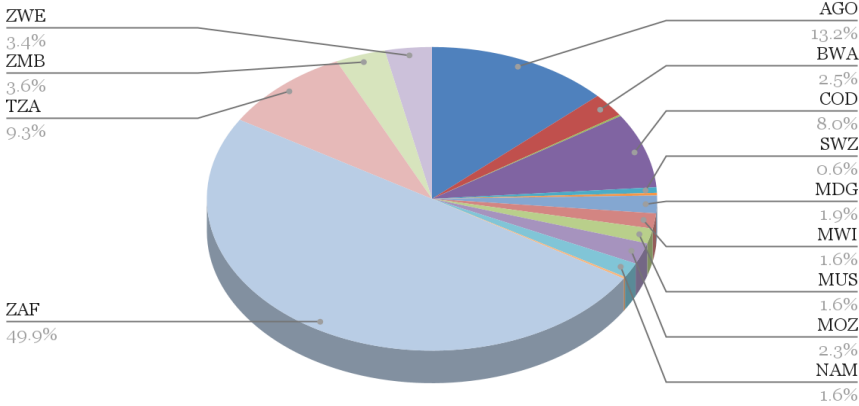


Figure 1: 2022 GDP percentage allocation for member states of the Southern African Development Community. Data retrieved from the World Development Indicator database via the World Bank's Databank. Last Updated: March 28th, 2024. AGO = Angola, BWA = Botswana, COM = Comoros, COD = Democratic Republic of Congo, SWZ = Eswatini, LSO = Lesotho, MDG = Madagascar, MWI = Malawi, MUS = Mauritius, MOZ = Mozambique, NAM = Namibia, SYC = Seychelles, ZAF = South Africa, TZA = Tanzania, ZMB = Zambia, and ZWE = Zimbabwe.

The figure below accentuates South Africa's dominance in GDP in comparison to other member states of the SADC. South Africa's strength in GDP is partly attributable to its regional strength in infrastructure development and institutional maturity (Levy et al., 2021).

Figure 2

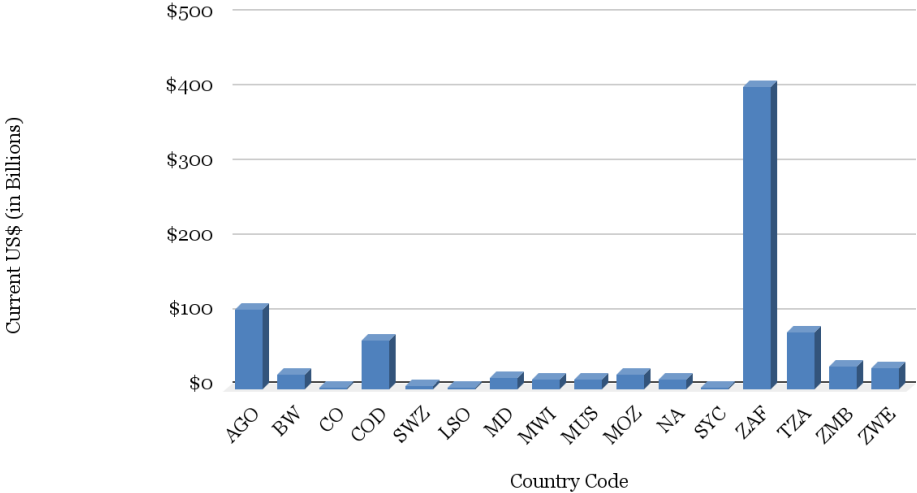


Figure 2: 2022 GDP in current US\$ (in billions) for member states of the Southern African Development Community. Data retrieved from the World Development Indicator database via the World Bank's Databank. Last Updated: March 28th, 2024. AGO = Angola, BWA = Botswana, COM = Comoros, COD = Democratic Republic of Congo, SWZ = Eswatini, LSO = Lesotho, MDG = Madagascar, MWI = Malawi, MUS = Mauritius, MOZ = Mozambique, NAM = Namibia, SYC = Seychelles, ZAF = South Africa, TZA = Tanzania, ZMB = Zambia, and ZWE = Zimbabwe.

Figure 3 illustrates that South Africa's debt servicing volumes have hegemonised the SADC region. Angola and Mozambique follow in respective order, though minimally relative to South Africa. Further, in both Figures 2 and 3, it is evident that South Africa's value exceeds that of Angola by approximately 4 times. This data is suggestive of South Africa's enhanced institutional capacity to manage sovereign debt and a more mature sovereign bond market than those of other SADC member states. This financial and capital market maturity likely catalyses greater investment confidence domestically, underscoring institutional and market maturity in promoting national development.

Figure 3

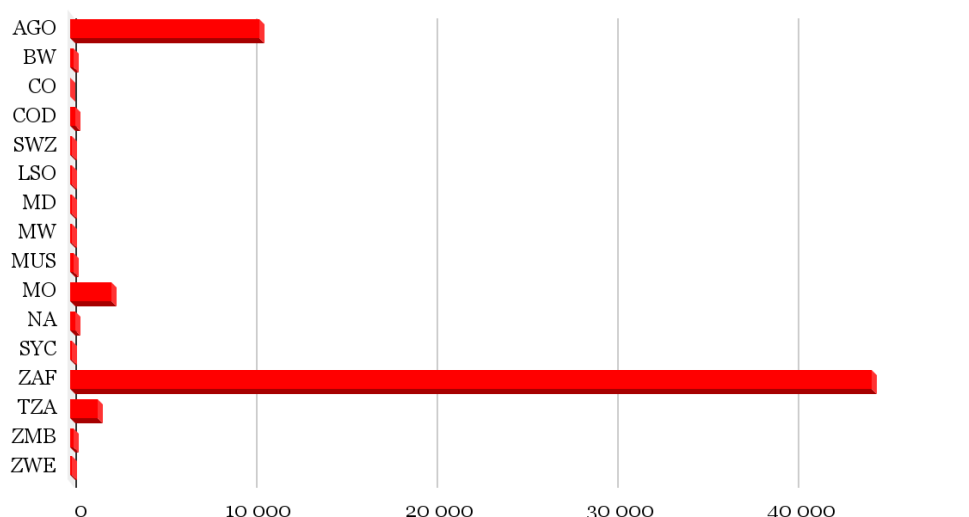


Figure 3: Debt servicing flows in SADC, million USD in 2021. Data retrieved from the National Statistical Offices of Member States in November 2023, available via the SADC Macroeconomic Statistical Yearbook 2022. AGO = Angola, BWA = Botswana, COM = Comoros, COD = Democratic Republic of Congo, SWZ = Eswatini, LSO = Lesotho, MDG = Madagascar, MWI = Malawi, MUS = Mauritius, MOZ = Mozambique, NAM = Namibia, SYC = Seychelles, ZAF = South Africa, TZA = Tanzania, ZMB = Zambia, and ZWE = Zimbabwe.

While the SADC functions to operate collaboratively, African countries have adopted various public debt management policies to drive their economic growth. Zambia, for instance, has historically experienced debt distress attributable to volatility in the demand for copper: the country's main exporting commodity. Through economic liberalisation policies, structural adjustment programs, and statutory debt increases that have contributed to external PPG debt reaching 8.88 billion USD in 2017, Zambia has routinely engaged in discussions with its creditors, such as the World Bank and the International Monetary Fund, to restructure its

debt (Charles & Lascu, 2019). As of March 2024, the Republic of Zambia and its bondholders reached an agreement which calls for the restructuring of Zambia's Eurobonds (World Bank Group, 2024). This comes after Zambia was the first country in Africa to default on its debt payments during the COVID-19 pandemic. According to the Official Creditor Committee, the agreement meets the comparability of treatment requirements and is consistent with the implications of the Joint World Bank-International Monetary Fund Debt Sustainability Framework (World Bank Group, 2024). As of July 2025, the Zambian Government has restructured 92% in principle with its creditors (Ministry of Finance and National Planning, 2025).

Angola is another country that has had sporadic debt levels historically. Angola is susceptible to macroeconomic volatility largely due to its reliance on exporting crude oil. In Africa, Angola exported the second-highest volume of crude oil from 2017 to 2022, only behind Nigeria (Charles, 2024). As of 2020, Angola's external debt as a percentage of its GDP neared 118.8% (Figure 4). As of April 2024, Angola's debt-to-GDP ratio is approximately 75% (Strohecker, 2024). However, in response to Angola's economic diversification efforts and a rise in oil prices amidst rising tensions in the Middle East, Angolan government officials as of April 2024 believe the country's debt-to-GDP ratio will approach 60% or less by 2027 (Strohecker, 2024). With declining oil revenues and tightened external financial conditions in the first half of 2025, however, reaching and sustaining a debt-to-GDP ratio below 60% becomes less predictable in the near future (International Monetary Fund, 2025). Both Zambia and Angola, in this instance, owe exceedingly high external debt volumes and suffer from a lack of export diversification.

Figure 4 shows the historical changes in total external debt as a percentage of GDP for members of the SADC. Countries such as Mozambique (54.7%), Lesotho (46.4%), and Zimbabwe (43.7%) all have external debt-to-GDP ratios around 50%, though each country and the SADC at large have varying levels from 2000 onward.

Figure 4

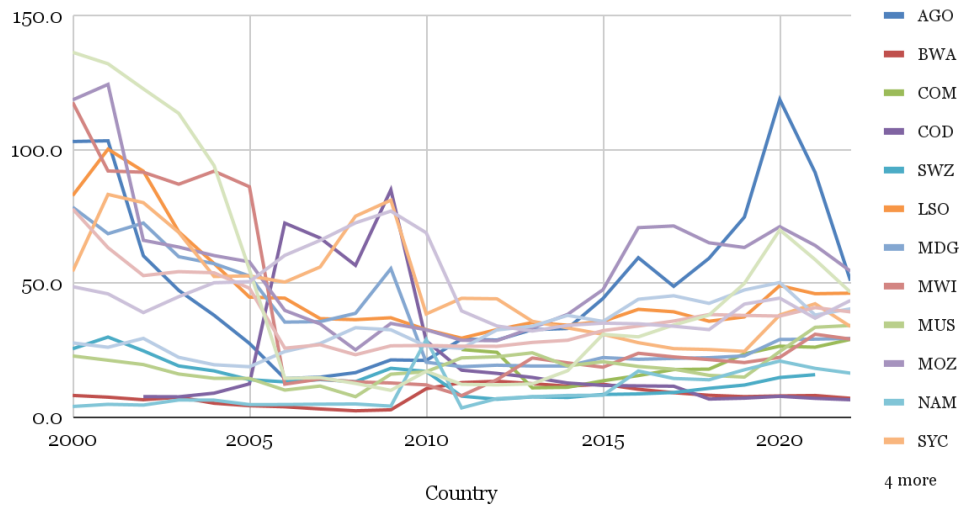


Figure 4: 2022 Total external debt as a percentage of GDP for SADC members (%) from 2000 to 2022. Data retrieved from the National Statistical Offices of Member States in November 2023, available via the SADC Macroeconomic Statistical Yearbook 2022. AGO = Angola, BWA = Botswana, COM = Comoros, COD = Democratic Republic of Congo, SWZ = Eswatini, LSO = Lesotho, MDG = Madagascar, MWI = Malawi, MUS = Mauritius, MOZ = Mozambique, NAM = Namibia, SYC = Seychelles, ZAF = South Africa, TZA = Tanzania, ZMB = Zambia, and ZWE = Zimbabwe.

From 2011 to 2022, Zambia (34.5%), Zimbabwe (37.1%), Lesotho (38.6%), and South Africa (39.6%) all have an average external debt to GDP ratio that nearly exceeds 40% (Figure 5). On the contrary, Botswana (10.2%), the Democratic Republic of Congo (11.1%), Eswatini (10.0%), and Namibia (12.9%) each have levels that approach approximately 10% (Figure 5). This information may suggest that SADC members have embraced different development models in accordance with their commodity production value chain, purchasing power, and exchange rate stability (or lack thereof).

Figure 5

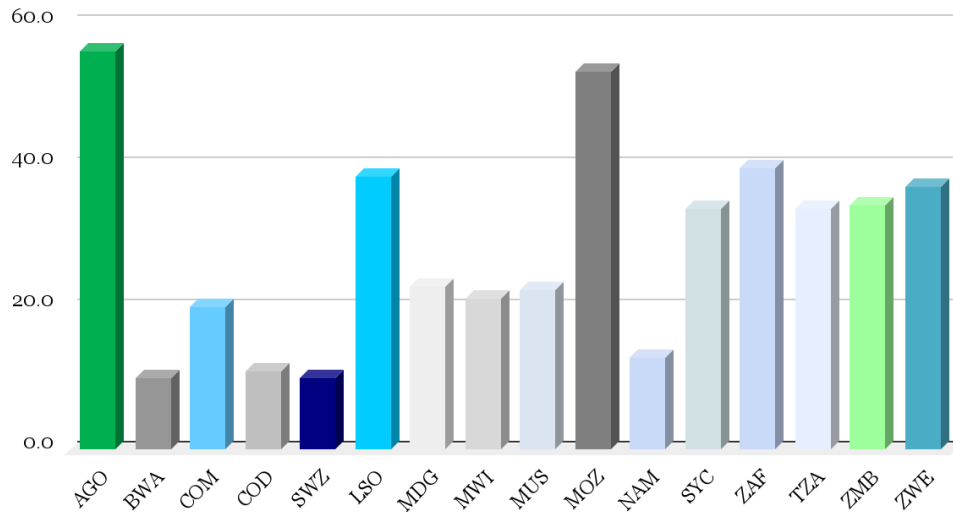


Figure 5: 2022 Average total external debt as a percentage of GDP for SADC members (%) from 2011 to 2022. Data retrieved from the National Statistical Offices of Member States in November 2023, available via the SADC Macroeconomic Statistical Yearbook 2022. AGO = Angola, BWA = Botswana, COM = Comoros, COD = Democratic Republic of Congo, SWZ = Eswatini, LSO = Lesotho, MDG = Madagascar, MWI = Malawi, MUS = Mauritius, MOZ = Mozambique, NAM = Namibia, SYC = Seychelles, ZAF = South Africa, TZA = Tanzania, ZMB = Zambia, and ZWE = Zimbabwe.

Paris Club

Pre-Paris Club Context

The Great Depression marked a significant economic downturn for the industrialised world. Prior to the Great Depression, there was ongoing speculation about a volatile stock market. As a result, investors sold overpriced shares, peaking at approximately 16 million shares on October 29th, 1929 (referred to as “Black Tuesday”). Shares diminished in value as consumer confidence reduced significantly, propelling spending and investment led factories to decrease both their production and workforce. American consumers fell into debt, and repossessions increased nationally (History.com Editors, 2009b). The culmination of these incidents marked the beginning of the Great Depression as economic challenges transcended beyond the United States, reaching other parts of the world, including Europe and prompting the abandonment of the gold standard. In theory, the globe’s adherence to the gold standard, a monetary system whereby a nation pegs its currency to the value of gold, positioned countries to fall short in increasing the amount of paper money in circulation if they were not able to increase their reserves of gold. The practicality of this theory changed once the United States and other countries that pegged their currency to gold slowly abandoned the gold standard, with Great Britain leading the way in 1931. Two years later, President Franklin D. Roosevelt of the United States signed the Gold Bill, an

executive order that illegalised the ownership of monetary gold by individuals and firms. By this time, thousands of banks in America had shut down operations, indicating a loss of confidence by investors in bank solvency (History.com Editors, 2018).

In addition to the Gold Bill, Franklin D. Roosevelt would go on to win passage for other bills such as the Agricultural Adjustment Act, the Tennessee Valley Authority Act, and the Glass-Steagall Act - all in his first 100 days as president (History.com Editors, 2009a). Despite President Roosevelt's actions to improve the American economy, the implications of the Great Depression were far from over. Worker strikes proliferated, and unions increased in following to improve worker rights. As the Great Depression progressed, the Second World War began when Nazi Germany invaded Poland in 1939. For six additional years, more than 50 nations battled, and an estimated 80 million people died. The war eventually ended once the United States dropped atomic bombs on Hiroshima and Nagasaki in 1945, which resulted in Japan's surrendering to the United States (Zapata, 2024). America played a pivotal role in liberating the Allied Powers, and sought to stabilise the international financial system thereafter to avoid future occurrences like the Great Depression. This was achieved through the Bretton Woods Agreement, which established the World Bank and the International Monetary Fund (IMF). The Bretton Woods Agreement was agreed upon at a meeting in Bretton Woods, New Hampshire, in 1944. 43 countries were present at this meeting, all of whom systematically aimed to rebuild the global economy. Allied countries such as the United States and Great Britain advocated for a multilateral framework to maintain international peace and security. The World Bank initially functioned to finance reconstruction and development projects in war-ravaged and low-income countries, whereas the International Monetary Fund functioned to harmonise its members' monetary policy and maintain balance in exchange rates (Bretton Woods Project, 2019). Both organisations functioned primarily to stabilise the international financial system, as external debt became a tool of foreign policy to liberalise economies across the globe. The Paris Club rose to prominence at this time.

Paris Club Overview

The Paris Club is an informal group of creditors that primarily meets to identify debt relief solutions for official debt owed to them. These debt relief solutions aim to stabilise a debtor country's economy via debt restructuring. Paris Club meetings take place roughly 10 times a year and consist of 22 permanent members. Excluding Brazil and the Russian Federation, all permanent members are a part of the Organisation for Economic Cooperation and Development. Beyond the permanent members, there are 14 Ad Hoc Participants; these participants, such as India and China, participate in negotiations with a debtor country that has substantial debt owed to them. Additionally, observers do not engage in debt negotiations - though there is some participation in Paris Club meetings (*Club De Paris*,

2024). In most cases, observers are representatives of nine international financial institutions, permanent members that do not have any debt owed to them by a debtor country requesting debt relief, and countries with debt owed to them who are unable to sign the Agreed Minutes: a document that details the debt treatment of consensus, constituting a key principle of the Paris Club's decision (*Club De Paris, 2024*). Decisions require consensus of terms amongst all participating creditor nations, as indicated in the Agreed Minutes of a case, leading to solidarity in the implementation of the terms of a case, wherein debt renegotiations are applied when a country has clearly demonstrated the need for debt relief. Consensus ruling prevents a creditor country from granting a debtor country more favourable terms than what is agreed upon by the consensus (*Club De Paris, 2024*). Presently, the Paris Club has concluded 483 agreements with 102 debtor countries. Paris Club agreements have contributed to 616 billion USD in debt treatments (*Club De Paris, 2024*).¹

Theory

Topic Modeling

Indexing systems are increasingly useful to gain insight into text composed of various densities of information. Rooted in advancements in vector space modelling for automatic indexing, topic modelling is one statistical technique in text mining that highlights thematic observations in a large collection of documents, indexing large arrays of information to produce meaningful insights. In topic modelling, there are several methods to conduct an analysis. These methods are classified as probabilistic or non-probabilistic models. Some probabilistic models are Latent Dirichlet Allocation (LDA) and Probabilistic Latent Semantic Analysis (PLSA). Non-probabilistic models, on the other hand, include Latent Semantic Analysis (LSA) and non-negative matrix factorisation (NNMF). The figure below includes a more advanced dissection of the hierarchy of topic modelling.

¹ Terms of the Paris Club can be found in Appendix A.

Figure 6

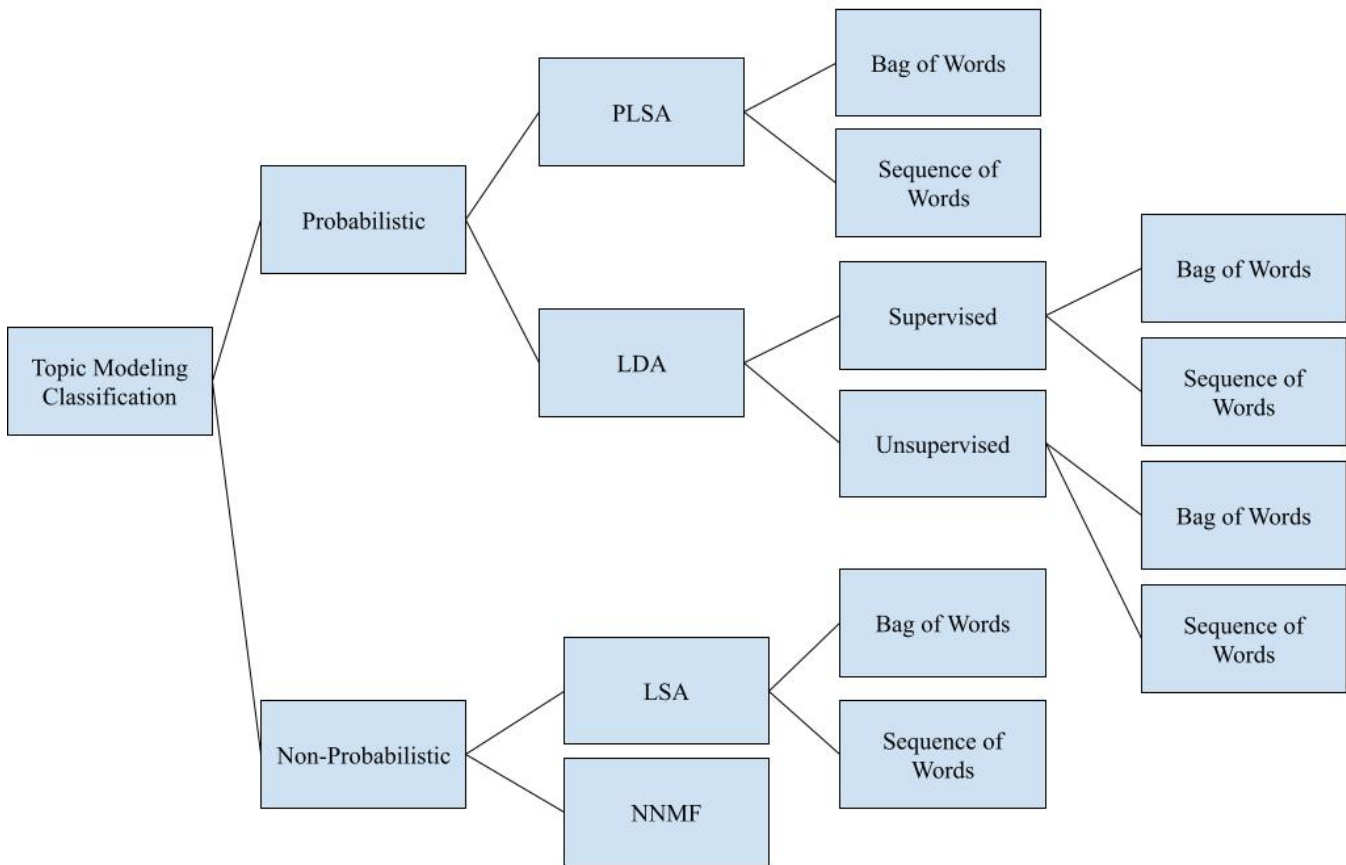


Figure 6: Topic Modelling Classification Hierarchy

As seen in Figure 6, topic modelling evolves into classifications of bag of words, sequence of words, supervised, and unsupervised classifications. These classifications are described in more detail in Appendix B.

Latent Dirichlet Allocation

For the purposes of this analysis, the emphasis will be on the application of an LDA, a topic modelling method that captures inter- and intra-document observational structures. An LDA can either be supervised or unsupervised in a bag of words or a sequence of words. The plate notation for an LDA is illustrated in Figure 7.

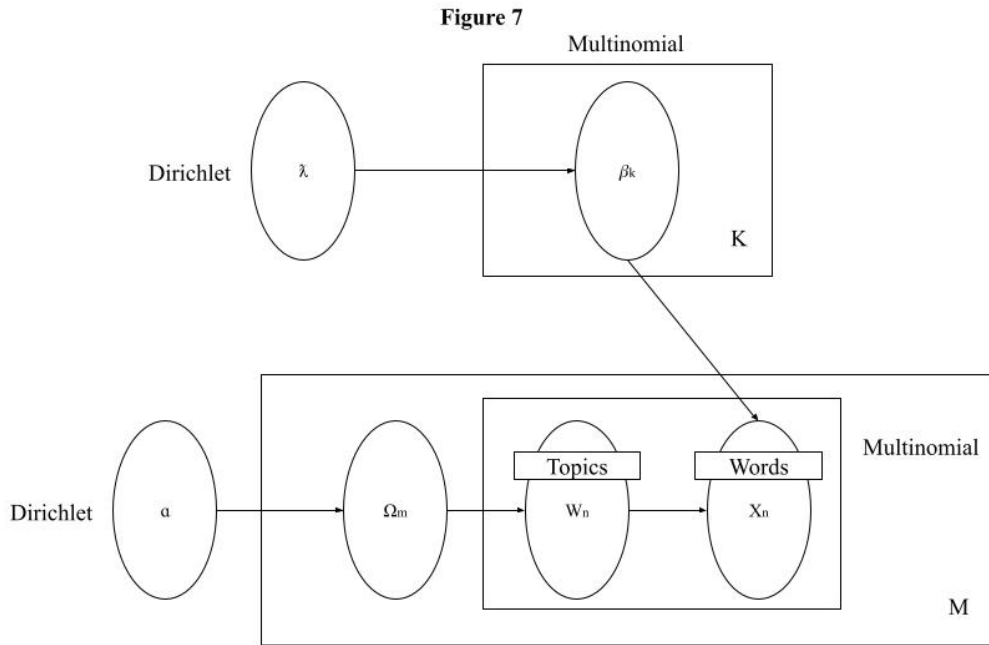


Figure 7: Latent Dirichlet Allocation Plate Notation

In accordance with the plate notation, the intra-document observational structures are represented by the Dirichlet distributions. On the other hand, the inter-document observational structures are represented by the multinomial distributions, wherein the density of the corpus generally increases with each additional document added to the LDA.

Data Analysis

The Topic-word Distribution Table showcases the results of the Latent Dirichlet Allocation:

Topic-word Distribution Table	
Topic	Words
1	0.001*"club" + 0.001*"paris" + 0.001*"debt" + 0.001*"angola" + 0.001*"creditors" + 0.001*"republic" + 0.001*"initiative" + 0.001*"extension" + 0.001*"countries" + 0.001*"government"
2	0.035*"paris" + 0.035*"club" + 0.029*"debt" + 0.022*"creditors" + 0.016*"countries" + 0.013*"million" + 0.012*"us" + 0.010*"economic" + 0.010*"enhanced" + 0.010*"reduction"
3	0.039*"debt" + 0.035*"republic" + 0.032*"club" + 0.030*"initiative" + 0.029*"paris" + 0.022*"service" + 0.020*"creditors" + 0.019*"suspension" + 0.017*"also" + 0.017*"united"

4	0.041*"seychelles" + 0.026*"paris" + 0.025*"republic" + 0.023*"club" + 0.021*"debt" + 0.016*"government" + 0.012*"drc" + 0.010*"repayment" + 0.009*"creditors" + 0.009*"operation"
5	0.031*"paris" + 0.031*"club" + 0.028*"zambia" + 0.027*"debt" + 0.023*"committee" + 0.023*"creditor" + 0.016*"common" + 0.016*"africa" + 0.015*"creditors" + 0.014*"south"

The words identified in topic 1 all have the same probability with a value of .001. These words include “club,” “paris,” “debt,” “angola,” and “creditors” among others. The culmination of these words indicates that this topic is likely concerned with the Paris Club, the Republic of Angola, and creditor nations addressing debt relief matters. On the other hand, the highest probability for topic 2 stems from “paris” (.035), alluding to the Paris Club’s plausible relevance. Other relevant words include “debt” (.029), “creditors” (.022), and “countries” (.016). This suggests that topic 2 is also related to creditor countries dealing with debt owed to them. For topic 3, the highest probability is “debt” (.039), followed by “republic” (.035) and “club” (.032). The probability of “debt” signifies that topic 3 has a more niche focus than topic 2. In addition, “republic” and “club” are highly represented within the corpus of documents, suggesting that topic 3 relates to a republic’s engagement with the Paris Club. Next, the highest probability for topic 4 is “seychelles” (.041), highlighting the importance of Seychelles to this topic. Other relevant words include “paris” (.026), “republic” (.025), and “debt” (.021). Other words associated with topic 4 are “drc” (.012), “repayment” (.010), and “creditors” (.009). These words suggest that the Democratic Republic of Congo and creditor repayment processes are intertwined in some fashion. Lastly, “paris” (.031) and “club” (.031) have the highest probability for topic 5, accentuating the Paris Club’s thematic significance in the corpus of this study’s documents. This is followed by noticeably high probabilities from “zambia” (.028), “debt” (.027), and both “creditor” and “committee” (.023 each). These values suggest that topic 5 is related to Zambia’s historical debt relief.

Interpretation

From the information above, we can infer the following:

- Topic 1 centres around the Paris Club’s work with countries such as the Republic of Angola to create innovative debt relief solutions such as debt service suspensions and extensions.
- Topic 2 focuses on the Paris Club’s engagement to address key sovereign debt issues for indebted countries with enhanced debt reductions.

- Topic 3 alludes to the Paris Club's initiatives aimed at debt service suspensions, particularly towards republics a part of the Southern African Development Community.
- Topic 4 focuses on the Republic of Seychelles and the Democratic Republic of Congo's debt repayment obligations to creditors, a part of the Paris Club.
- Topic 5 is about the Paris Club's historical engagement with Zambia to address its recurring debt challenges, potentially denoting the importance of the Common Framework for Debt Treatments as of 2020.

Summary of Findings

The paper's analysis revealed topical observations related to the Paris Club's archives for member states of the Southern African Development Community. Ultimately, it was found that the archives highlighted the Paris Club's role in creating debt relief solutions such as debt service suspensions and reductions tailored for the SADC; however, countries of specific significance to the Paris Club's public-facing interventions include the Republic of Angola, the Republic of Seychelles, the Democratic Republic of Congo, and the Republic of Zambia. Since documents for this analysis range from 2001 to 2024, it is reasonable to believe that Angola, Seychelles, the Democratic Republic of Congo, and Zambia have a challenge in obtaining prolonged debt sustainability, as demonstrated by dedicated engagements with the Paris Club. With this said, we confirm the initial segment of our hypothesis that the results will indicate a topical leaning towards debt restructuring subject to the Paris Club's archives pursuant to the Southern African Development Community. However, contrary to our initial belief, direct elements of supranationalism with topical leanings towards "alliance," "united," or "unity" generally cannot be explicitly inferred from the topic-word distribution table.

Significance

The significance of this study is underscored by the supranational composition of the Paris Club in international debt discussions, with a particular emphasis on coordinated debt restructuring processes. Each debtor country that receives debt relief operates under an International Monetary Fund (IMF) program supported by a conditional arrangement; consequently, the Paris Club's archives offer a historical picture of its public-facing priorities toward the Southern African Development Community. Moreover, upon a deeper analysis, the Paris Club's archives serve as an illustration of potential geopolitical alliance structures and their evolution over time that may highlight patterns of foreign policy led by supranational forces pursuant to nations in Southern Africa. Lastly, in consideration of the fact that the Paris Club's permanent members are mostly a part of the Organisation for Economic Cooperation and Development (except the Russian Federation and Brazil), Seychelles, Zambia, the Democratic Republic of Congo, and Angola may have unique

underlying characteristics that substantiate their prioritization in regional debt restructuring coordinated with the Paris Club, potentially reflecting the imposition of conditionalities related to democratic expansion and market economy maturation.

Limitations

As with any research study, there are limitations to this paper's analysis. Firstly, this analysis only focused on the period 2001 to 2024, narrowing results so that they are only relevant for a specific segment of the Paris Club's existence and exclusive of Mauritius, Zimbabwe, and the Kingdom of Eswatini. Secondly, the LDA is known to generalise poorly on unseen data due to overfitting, particularly when the number of topics is not optimally set (Dhameeth, 2024). Lastly, the stochastic nature of LDA may result in subjects that are difficult to understand or implement, making the generated topics uninterpretable at times (Calistus et al., 2024). This deficiency could rationalise Seychelles' probabilistic significance to the model despite its lower macroeconomic strength compared to Zambia, Angola, and the Democratic Republic of Congo. Ultimately, these latter two limitations relate to the general weaknesses of the LDA, which may affect the robustness of this analysis. However, with appropriate model refinements, the LDA can be optimised to enhance this study's analytical quality. Future improvements may include expanding the corpus with data from multiple sources beyond the Paris Club and integrating qualitative or quantitative benchmarks to assess model performance.

Conclusion

The majority of supranational organisations are created when nations decide to work toward a shared objective. As is the case in Southern Africa, there are several examples of supranational organisations working to achieve equitable development, as evidenced by the former SADCC and the current SADC. The member states in the SADC, such as Angola, Seychelles, the Democratic Republic of Congo, and Zambia, have historic debt sustainability challenges, requiring innovative debt relief solutions from their creditors, partly composed of Paris Club members. Through a propensity for debt restructuring as accentuated by the results of the Latent Dirichlet Allocation model, the club's debt relief options have sought to stabilise the macroeconomic conditions and financial standing of debtor nations constituting the SADC. From the formation of the Bretton Woods Institutions to the imposition of consensus ruling by the Paris Club, supranational economic stabilising instruments continue to represent tools of diplomatic engagement amidst global debt instability. In consideration of the aforementioned information, it is worth investigating the evolution of debt relief instruments leveraged by the SADC in the future. Further, the quantitative quality of this paper can be complemented by additional analysis using a larger pool of documents or with benchmarks to assess the model's performance.

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Appendix

Appendix A: Paris Club Debt Relief Terms

<i>Term Name</i>	<i>Eligibility</i>	<i>Debt Relief Classification</i>	<i>Description</i>
Classic Terms	All countries are eligible for Paris Club relief.	Debt Rescheduling	Credits are rescheduled at the appropriate market rate with a repayment profile negotiated on a case-by-case basis.
Houston Terms	Evaluation of track record with the IMF and the Paris Club. Two of the following three criteria must be met: (1) GDP per capita smaller than 2,995 USD, (2) high indebtedness, and (3) official bilateral debt stock of at least 150% of private debt.	Debt Rescheduling	Non-ODA credits are rescheduled at the appropriate market rate over around 15 years with 2-3 years grace and progressive payments raising on a yearly basis. ODA credits are rescheduled at an interest rate at least as favourable as the original concessional interest rate applying to these loans. This is normally over 20 years with a 10-year maximum grace period. Houston terms also enable creditor countries to conduct debt swaps with a debtor country. Creditors and debtors conduct

			reports to the Paris Club Secretariat on the conducted debt swaps.
Naples Terms	<p>Evaluation of the track record of the debtor country with the IMF and the Paris Club.</p> <p>Evaluation seeks to determine if a debtor country has a high level of indebtedness, has 755 USD GDP per capita or less, and receives funding from the World Bank's IDA.</p>	Debt Reduction	<p>Non-ODA creditors are cancelled to a 67% level after a possible top-up. ODA credits are rescheduled at an interest rate at least as favourable as the original concessional interest rate applying to these loans. Naples terms also enable creditor countries to conduct debt swaps with a debtor country. Creditors and debtors conduct reports to the Paris Club Secretariat on the conducted debt swaps.</p>
Cologne Terms	<p>Countries eligible for the IMF and the World Bank's Highly Indebted Poor Countries Initiative (HIPC). These countries must have a strong track record with the Paris Club and continuous</p>	Debt Reduction	<p>Non-ODA credits are cancelled up to a 90% level or more, depending on context. ODA credits are rescheduled at an interest rate at least as favourable as the original concessional interest rate applying to these loans. Cologne terms also</p>

	economic adjustment.		enable creditor countries to conduct debt swaps with a debtor country. Creditors and debtors conduct reports to the Paris Club Secretariat on the conducted debt swaps. Creditors have the option of cancelling commercial claims that exceed the one provided by the Paris Club agreements.
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Source: (Club De Paris, 2024)

Appendix B: Topic Modelling Classifications

<i>Classification Name</i>	<i>Description</i>
Bag of Words	A text embedding process which relies on document vectors in preparation for a natural language processing task.
Sequence of Words	An approach in topic modelling that uses n-gram statistics and a Hierarchical Dirichlet Bigram model (Kherwa & Bansal, 2019).
Unsupervised	Unsupervised learning uses machine learning (ML) algorithms to analyse and cluster unlabelled data sets (IBM, 2024a).
Supervised	Supervised learning is defined by its use of labelled data sets to train algorithms to classify data or predict outcomes accurately (IBM, 2024b).