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Tangled up in a spaghetti bowl

– trade effects of overlapping preferential trade agreements in Africa

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ABSTRACT: Overlapping trade agreements in Africa are often brought up as an obstacle to the trade effect of preferential integration and referred to as the spaghetti bowl. The problem has not been investigated empirically before although it is often discussed by observers of the African economy. The purpose of this study is to describe the spaghetti bowl in Africa and to assess its impact on the effect of preferential integration with the help of a gravity model. The data cover intra-Africa bilateral trade flows for Africa's 53 countries. The study could not provide evidence of a negative effect of overlapping agreements on preferential integration and hence trade.

Keywords: spaghetti bowl, Africa trade, gravity model, preferential/regional integration.

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Abbreviations

CEMAC= Economic and Monetary Community of Central Africa

COMESA= Common Market of Eastern and Southern Africa

CU= Customs Union

EAC= East African Community

EC= European Commission

ECOWAS= Economic Community of West African States

EFTA= European Free Trade Association

EPA= Economic Partnership Agreement

FTA= Free Trade Area

GATT= General Agreement on Tariffs and Trade

GSP= Generalized System of Preferences

GSTP= General System of Trade Preferences for developing countries

IMF= International Monetary Foundation

LDC= Least Developed Country

PAFTA= Pan-Arab Free Trade Area

PTA= Preferential Trade Agreement

PTN= Protocol on Trade Negotiations

RTA= Regional Trade Agreement

WTO= World Trade Organization

SACU= South African Customs Union

SADC= Southern African Development Community

UNCTAD= United Nation Conference on Trade and Development

UNECA= United Nation Economic Commission for Africa

WAEMU= West African Economic and Monetary Union

1. Introduction

The spaghetti bowl concept is often mentioned in literature about African trade and refers to the continent's web of overlapping trade agreements. The spaghetti bowl is presented as an obstacle to successful regional integration and trade in Africa. Overlapping memberships are argued to make implementation of preferential integration agreements difficult and increase transaction costs in trade through a growing web of agreement rules. A reasonable hypothesis is therefore that overlapping regional integration agreements might hamper the effect of preferential integration in Africa and hence have a negative impact on intra-African trade flows.

Although the spaghetti bowl often is brought up as a problem it is seldom discussed and examined much further. Even though it is a well-known phenomenon, its effect has not been investigated empirically before. The purpose of this essay is to describe the spaghetti bowl phenomenon in Africa and estimate its potential negative effect of preferential integration and hence trade. To assess the impact econometrically the spaghetti bowl is estimated with the help of a gravity model.

The gravity model is often used to estimate the impact of preferential integration on bilateral trade flows. It is therefore an appropriate method for the purpose of this thesis. Cross-sectional data on intra-African trade flows for all African countries are used in the estimation of the model.

The study could not present any stable significant results for the variables of interest, as the regression results from the empirical study were ambiguous. Possible explanations to the unclear results and how to address the ambiguities are discussed in the last part of the essay.

To contextualize the subject of the essay, the essay begins with an overview of the theoretical considerations on preferential integration and the status of trade and preferential integration in Africa. Thereafter, the spaghetti bowl phenomenon is discussed and defined in an own chapter. In the fourth section, the gravity model is described and specified. Finally, the impact of the spaghetti bowl is assessed econometrically and the results discussed. The essay is

rounded off by some conclusions about the spaghetti bowl and successful preferential integration in Africa.

2. Putting the spaghetti bowl in context: theoretical considerations and current challenges of intra-African trade and preferential integration

This section will define the concept of preferential integration and describe the World Trade Organisation (WTO) rules on preferential trade agreements (PTAs) and the current global trends of preferential integration. Furthermore, the rationale for entering a PTA is discussed. The status of trade and economic integration in Africa is evaluated. As intra-Africa trade has traditionally been low compared to other regions and the performance of preferential integration limited, related impediments are analysed.

2.1. Preferential trade agreements: theoretical considerations

What is meant by preferential integration is basically that a group of countries sign an agreement that states that member countries apply a preferential trade policy towards each other, normally by lowering or removing formal trade barriers (shallow integration) but sometimes also to develop common policies and harmonize markets (deep integration). Preferential trade agreements have become subject to discussion in the context of the WTO, where non-discrimination among trade partners is one of the core principles.

2.1.1. WTO rules on preferential integration – the GATT Art XXIV and the Enabling Clause

Preferential integration violates the Most Favoured Nation (MFN) principle in the WTO, which states that all WTO-members should be treated equally in terms of trade policy. PTAs are allowed during certain circumstances. The criteria for preferential trade are regulated in General Agreement on Tariffs and Trade (GATT) Art XXIV. The article states that preferential integration is accepted if trade barriers do not rise on average on trade with outside countries, trade is liberalized on substantially all goods within the PTA within a reasonable time and that the PTA is notified to the WTO (Hoekman & Kostecki 2009, p. 484) For PTAs between developing countries there are special rules that can be found in the Enabling Clause. The Enabling Clause regulates allowed trade preferences between developed and developing countries (Generalized System of Preferences GSP). The clause gives also

more flexibility to trade agreements between developing countries (Hoekman & Kostecki 2009, p. 537) within the scope of the GSTP (Generalized System of Trade Preferences for developing countries). Worth noting is that there are PTAs including developing countries that are listed under GATT Art XXIV instead of the Enabling Clause.

There are different types of PTAs. A free trade area (FTA) is an agreement between countries that implies liberalization of internal trade, while external tariffs are decided by the individual member countries. A customs union (CU) is formed when a group of countries liberalize internal trade and apply a common external trade policy. Thus, a customs union means deeper integration than a free trade area. Other forms of economic integration are common markets (for goods and factors of production), monetary unions and fiscal unions. It is common that countries located near or next to each other PTAs, sometimes called regional integration agreements (RTAs), often aimed at reducing the risk of conflict and reach improved agreements on shared resources. Other reasons may be to reduce transaction costs at the border or to guarantee tariff and fiscal revenue by making smuggling less profitable (Shiff & Winters 2003, p. 71-72).

2.1.2. Current trends of preferential trade agreements

During the last decades the world has experienced a PTA proliferation. According to the World Trade Report (WTO 2011, p. 55), the participation of developing countries in PTAs has increased and the number of South-South trade agreements has grown significantly. As pointed out by Baldwin (1995), the cost of being a non-PTA member increases when your trading partners enter PTAs, as the relative competitiveness of non-member countries decreases compared to the member countries that trade on a preferential basis. Hence a domino effect of PTAs can be observed as more and more countries enter PTAs.

As the number of PTAs has increased over time, so has their impact on the global trading system. Baldwin (2006) suggests that the increase in the number of PTAs can be described as a spaghetti bowl of trade agreements. The trend seem to be here to stay and is not necessarily purely beneficial from a trading perspective. It is therefore important to assess the potential problems caused by PTA proliferation. Examples on such problems is overlapping memberships and conflicting set of rules.

2.1.3. The rationale for preferential trade – some perspectives on preferential integration

There can be several motivations for preferential integration. Probably the most prominent goal is to achieve free trade between members of the agreement and increase trade within the integration area. Preferential liberalization is discriminatory, so non-members of the trading bloc face higher trade barriers than members. A PTA is a smaller entity than the multilateral trading system, which makes it easier for the member countries to negotiate on trade rules, removal of trade barriers and market access and hence it also facilitates deeper integration. Preferential integration can be viewed as a way for developing countries to promote industrialization by forming local production networks among member countries (often LDCs) that normally trade very little, and give them a chance to participate in regional trade (World Trade Report, World Bank 2011, p. 56).

Moreover, preferential integration can be beneficial from a market size and scale effect perspective as it leads to an expansion of regional markets. A larger market offers greater possibilities for specialization and product differentiation, which attract companies to the market and promote trade and growth in the region (Baldwin & Wyplozc 2009, p. 402). A larger market leads under the assumption of imperfect competition to a process of industrial restructuring, leaving a few efficient producers on the market that charge lower prices due to lower average cost in production (Baldwin & Wyplozc 2009, p. 205).

The forming of PTAs can also be understood from non-economic perspectives. A PTA means membership of a larger trading bloc and therefore PTA participation may give small countries more power in multilateral trade negotiations. A PTA could also be formed to achieve a common security policy or to develop transnational infrastructure to lower transaction costs (Hoekman & Kostecki 2009, p. 479-480). PTAs may offer countries greater credibility of domestic reform and can serve as a policy anchor. Furthermore, preferential integration gives national policy makers greater influence in the decision-making than what would be offered them in multilateral negotiations and this might also be important for the forming of PTAs (Bhagwati, Greenaway & Panagariya 1998).

Critics of preferential integration mean that regional trading blocs limit global trade liberalization due to high external trade barriers (United Nation Conference on Trade and Development (UNCTAD) 2009). Moreover, the welfare effects of preferential integration

seem ambiguous and dependent on whom you chose to liberalize trade with, the so-called Viner's ambiguity. Viner's ambiguity is connected to the concepts of trade creation and trade diversion. On one hand, liberalization with certain trade partners generates positive effects as high-cost products in the home country can be substituted to low-cost products from the partner countries. This is the trade creating effect. On the other hand, as preferential integration is discriminatory, countries outside the agreement face higher tariffs than the members. Even though the products from a non-member country may be cheapest, the discriminatory tariffs mean that the goods from non-member countries become more expensive. These products will instead be imported from member countries that do not face tariffs, even though they are not the most efficient producers. Accordingly, the preferential integration has generated a new inefficiency and this is the trade diverting part (Baldwin & Wyplosz 2009 p. 171).

This essay discusses the spaghetti bowl effect, which can be regarded as a potential negative transaction cost effect of PTA proliferation. Multiple overlapping PTA membership is likely to higher the transaction costs due to an increased amount of rules and hence complexity in trade procedures. The effect is examined in an own chapter below (see section 3).

2.2. Current status and challenges of African trade and preferential integration

2.2.1. Intra-Africa trade levels and composition

Intra-African trade has been low compared to other regions. 2004-2006, intra-African exports amounted to 8.7 % of total trade compared to 71.4 % for Europe. Corresponding figures for imports were 9.6 % versus 68.1 %. Since the beginning of the 2000s, intra-Africa trade has stabilized at approximately 10 % of total trade flows (UNCTAD 2009, p.20; 23). African exports consist mainly of primary products while imports are made up by a variety of manufactures (United Nation Economic Commission for Africa (UNECA) 2011). Of trade within the continent, the export goods are a quite even combination of fuels, primary products and manufactures. Trade within Africa is more varied than the continent's trade with the rest of the world and expanding intra-Africa trade may be a chance for increased product specialization and export diversification (UNCTAD 2009).

When discussing trade levels in Africa it is important to remember that trade within the informal sector is large-scale (UNECA 2011). This means that trade data and reports on the composition of African trade should be treated with some caution.

2.2.2. An overview of preferential integration in Africa

The African continent is home to several regional trading blocks and PTAs with countries outside Africa. Their aim is to enhance the development of some of the world's poorest countries through stimulating trade and economic cooperation. The Abuja Treaty in 1991 lined out a development plan for a single African Economic Community (AEC) where small regional communities should serve as building blocks for a pan-African trading community. The Abuja Treaty has given the regional integration projects some legal validity, but according to Tavares and Tang (2011) the aim seems hollowed and there is a lack of concrete implementations of the integration schemes.

The aims of regional integration agreements in Africa are often large-scale, and strive to promote trade, growth and development through a wide range of strategies, from removal of trade barriers to development goals. The main focus lies on intra-regional tariff reduction while external trade barriers remain quite high. The trade liberalization plans are not always fully implemented, partly because tariff revenue is an important source of income for many governments. Despite or maybe due to high ambitions, statistical analysis indicates that RTAs in Africa seem to have a very little impact on intra-Africa trade. The impact on export performance has been documented low and the welfare effects are ambiguous (Yang & Gupta 2005). Poor initial conditions for integration and an inward-oriented trade policy have also hindered RTA performance and many of the agreements overlap, which induces administrative challenges and implementation difficulties (UNCTAD 2009).

African countries have also signed a range of PTAs with countries outside Africa. Shiff and Winters (2003, p. 25) argue that agreements with developed countries may be more beneficial to poor countries than agreements with other developing countries. Agreements with developed countries may for example have positive external effects for the poorer country, through technological spill-overs and an upsurge in foreign direct investment. But according to for example Tavares and Tang (2011) and Yang and Gupta (2005) these agreements have contributed to the complexities of economic integration through confusion about integration goals and multiple set of rules.

2.2.3. Obstacles to intra-Africa trade and successful regional integration

If regional integration leads to market expansion and product diversification, it may relax the constraints on intra-Africa trade (UNCTAD 2009). Many African policy makers view regional integration as a stepping-stone to efficient industrialisation and to participation in the world market. But in order to reap the benefits from preferential trade agreements, a condition is that market institutions promote trade and economic growth. Examples of such institutions are good infrastructure, social capital and market predictability. These institutions are not always in place in Africa. High transport costs and cumbersome trading procedures are argued to be the most powerful obstacle to successful trade and economic growth in Africa (UNCTAD 2011) combined with low institutional capacity. The African countries have not gained much from regional integration as poor infrastructures and conflicts limit trade creation (UNECA 2011). It has also been suggested, that Africa's PTAs with countries outside the continent have contributed to the low performance of regional integration in Africa. Another reason for low implementation of trade agreements can be that multiple PTA membership makes regional integration cumbersome. As this is at the centre of this essay, the problem will be examined in an own chapter below (see section 3).

Coulibaly and Fontagné (2004) point out that geographical and infrastructural deficits are core obstacles to intra-Africa trade as the transport costs rise when transit time of traded goods is enhanced by for example low quality of roads and poorly working border institutions. According to data from the World Bank, only 18.3 % of the total road network of Sub-Saharan Africa was paved in 2008, compared to 92 % for the European Union (World Development Indicators, World Bank 2011). Infrastructure is often more developed along the coastlines, and therefore landlocked countries experience an extra infrastructural disadvantage (Bourdet & Gullstrand 2007) and become heavily dependent on their neighbours. As the neighbours often possess the same goods and resources, regional trade remains low and the countries poor (UNCTAD 2009). Moreover, trade flows in Africa are affected by colonial history. The infrastructure in Africa was not built up to promote intra-Africa trade and a large percentage of African exports are directed towards the EU (UNCTAD 2009).

Social capital, transparency and predictability of markets are all parts of an economy's institutional capital and are essential for economic activity. Corruption and a non-transparent administration apparatus block trade as well as growth as long-term investment initiatives and

entrepreneurship are hampered by lack of market predictability. For example, if systems for border controls and fees are missing or not in force, customs officials have no rules to follow and the border procedures become cumbersome and unpredictable due to rigorous controls and delays. Hence the transaction costs rise and trade is negatively affected. Moreover, lack of structure creates great space for bribery and rent seeking, which further enhance the unpredictability of trade procedures (UNCTAD 2009). This can also be one reason for large informal trade flows. A transparent and efficient bureaucracy is also fundamental for the functioning of the public sector and the implementation of policy schemes. Consequently, poor institutions and corruption also make it hard to implement policy reforms aimed at for example improving infrastructure.

When discussing poor border infrastructure as an obstacle to trade, the concept of trade facilitation should be addressed. Trade facilitation can be defined as the process of promoting trade through minimizing the amount of red tape at the borders (Persson 2011). In numbers, the average time for exporting a good across a border in Africa is some 31 days and for importing a good some 35 days. For the OECD countries the exporting time is some 11 days and the importing time about 13 days¹ (Doing Business Database, World Bank 2011).

Moreover, according to Bourdet and Petersson (2007) economic activity in Africa is concentrated to the economic and demographically largest countries, which has led to trade diversion on the behalf of the poorest countries. It could also be argued, that the objectives of African RTAs risk to be disturbed by frequent conflict and political instability. Bourdet and Gullstrand (2007) also mention cultural and lingual disparities as a potential trade barrier.

To sum up, poor infrastructure and low institutional quality can be said to be obstacles to intra-Africa trade and successful regional integration in Africa. Low levels of product differentiation are also a central problem. As long as these hindrances are present, transaction costs within the continent are likely to remain high. It can also be argued that preferential trade agreements with countries outside Africa contributes to the fragmentation of intra-Africa economic integration. But, except the issues traditionally pointed out as hindrances to successful trade and integration in Africa, the low performance of regional integration can also be a consequence of implementation difficulties caused by overlapping regional

¹ The values have been calculated as a simple mean value.

integration agreements. The spaghetti bowl of rules is therefore important to address when discussing impediments to trade and integration in Africa.

3. The spaghetti bowl – overlapping preferential trade agreements

The centre of attention for this essay is that overlapping trade agreements might make implementation of regional integration policy complicated. Overlapping trade agreements bring about administrative difficulties that may limit the trade effect of regional integration and partly explain the low performance of trade agreements in Africa. This section discusses what the literature says about the spaghetti bowl. First, regional overlaps within Africa are examined and thereafter the spaghetti bowl is stretched out to include extra-Africa PTAs.

3.1. The spaghetti bowl phenomenon

As discussed above, there has been a recent hike in the number of PTAs all over the world. The situation with overlapping PTAs with conflicting rules is often referred to as the spaghetti bowl and may be problematic for the member countries.

Jagdish Bhagwati, who coined the spaghetti bowl term in 1995, discussed that PTA proliferation makes trade procedures more complicated by increasing the number of tariffs and rules of origin. Hence the concept is relevant both for CUs and FTAs. The spaghetti bowl concept in itself is a bit blurry and applicable to a wide range of situations dealing with complex systems and not only the many PTAs in Africa. Baldwin (2006) uses for example the term to describe the complete global trend of regionalism and the spaghetti bowl phenomenon may hence be defined in various ways. The overlaps can be assumed to create substantial problems in the context of Africa as the continent in general is suffering from poor institutions as discussed above, but could also be an issue for industrialized countries but from a slightly different angle.

One explanation to a “spaghetti proliferation” of PTAs is that multiple membership may generate duty-free market access and zero-tariffs on imports with many trading partners and can hence be an appealing alternative to national policy makers as a substitute to free trade (Schiff & Winters 2003, p. 75). The will of reaping the benefits of PTA membership from a whole group of preferential agreements may explain the agreement overlaps in Africa. But, instead of promoting trade, the result of multiple memberships might instead be higher transaction costs due to a mass of overlapping rules (Schiff & Winters 2003, p. 78). The

proliferation of PTAs may also be addressed from a public choice perspective, where public officials want to blow up the administration to receive personal gains, in line with what has been suggested by Bhagwati et al (1998) above (see section 2.1.3).

Most observers² of African regionalism mention the troubles for policy makers caused by overlapping regional integration agreements. Overlapping trade agreements are often assumed to be a reason for the weak implementation of regional integration schemes in Africa (Yang & Gupta 2005) and the limited trade effects of the agreements. To administrate conflicting set of rules can be regarded as an impediment to potential trade creation from preferential integration and create confusion about integration goals (UNCTAD 2009). The spaghetti bowl in an African context can be argued to include PTAs within Africa as well as agreements that include countries outside Africa.

Tavares and Tang (2011) suggest that the complexities created by overlapping memberships risk slowing down trade liberalization within the integration area and hampering the effect on integration and give concrete examples of tricky situations caused by the spaghetti bowl of rules. They mention ECOWAS and WAEMU, where the regional groupings overlap and have different plans for reducing trade barriers. Another example is the Southern African Development Community (SADC), where a number of members also belong to the Common Market of Eastern and Southern Africa (COMESA) or/and the East African Community (EAC). The article also includes survey evidence that shows that more than 25 % of national policy makers think that overlapping agreements makes it hard to meet intended integration commitments. 23 % find agreement overlap as a reason for low programme implementation.

In the case of overlapping CUs the complexity is caused by different tariff applications and non-tariff barriers, as according to Yang and Gupta (2005) may be a challenge for the countries that are members of both the East African Community (EAC) and the Common Market of Eastern and Southern Africa (COMESA). When it comes to FTAs, the rise in the number of rules of origin can cause additional difficulties in form of trade deflection. Trade deflection is a loophole for exporters that want to take advantage of different tariff rates within an FTA by imports to the country with the lowest tariff, for further re-exportation to other FTA members. A common solution to the problem of trade deflection is to have rules of

² See for example UNCTAD (2009), UNECA (2011), Tavares & Tang (2011) and Yang & Gupta (2005).

origin. By controlling the origin of products entering the country it is guaranteed that the right tariff rate is being applied to the goods. The problem with too many and too strict rules of origin is that the trade procedures becomes complicated, as the production often is localised in different areas. Then the cumbersome task for those working with the rules of origin is to decide where a product is mostly from and thereafter to apply the correct tariff rate (Baldwin & Wyplosz 2009, p. 178).

Flatters (2003) points out that for example the Southern African Development Community (SADC) has highly restrictive rules of origin in several sectors, as a consequence of certain interests within the RTA. The Common Market of Eastern and Southern Africa (COMESA) partly overlaps with SADC and had initially quite simple rules of origin. Flatters argue that lately COMESA has begun to adopt rules of origin that are more like the SADC trade regime in complexity. For the countries that are members of both COMESA and SADC, the increased intricacy of rules might make it hard for policy makers to implement the integration agreements properly and make it hard to reap benefits from preferential integration.

Worth noting is also that the Economic and Monetary Communion of Central Africa (CEMAC) and West African Economic and Monetary Union (WAEMU) have a common currency within each union. Most likely, to administer a common currency with a central bank may further enhance the complexity of integration.

The spaghetti bowl is often brought up when discussing agreements within Africa, but many African countries have also signed trade agreements with countries outside Africa and these agreements can also be argued to contribute to the spaghetti bowl. The rules of these agreements add to the administrative difficulties of the spaghetti bowl and have an impact on the implementation of trade agreements within Africa. These agreements may affect intra-Africa trade both directly and indirectly and should be included in a discussion about the trade effects of the spaghetti bowl in Africa.

According to Tavares and Tang (2011) trade negotiations between the EU and Africa has contributed to further fragmentation and complexities of African preferential integration, as the negotiations sometimes cover only one or at best a few countries of a regional bloc. Hence the extra-Africa agreements may add extra overlaps. Yang and Gupta (2005) argue that the hub-and-spoke structure of the global network of PTAs disfavour small countries. The larger

hubs benefit more from the system, as the smaller spokes have a too weak administrative capacity to implement the agreements.

It is also appropriate to assess the challenges for developing countries related to the multilateral trading system. Majluf (2004) argues that rules on the WTO level could disturb the implementation of PTAs among developing countries. To keep PTAs consistent with the WTO system and rules for preferential integration may enhance the administrative complexities of preferential integration and may reduce its trade liberalization and development potential. Hence the WTO rules should in some way be considered in a discussion of the spaghetti bowl.

As overlapping agreements increase the administration of trade procedures, the problem is closely related to the concept of infrastructure and trade facilitation discussed above. To untangle the spaghetti bowl of African regionalism may hence be an important part of facilitating trade in the context of African preferential trade through making the intra-Africa trading system more transparent.

It is appropriate to raise the question whether the spaghetti bowl theory is relevant at all in relation to other countries and if it is meaningful to discuss the issue for example in the context of the OECD countries that can for example be assumed to have a efficient administration that can manage more complex systems. From a public choice perspective, the spaghetti bowl might still be relevant. It might be so that bureaucrats and personnel in public administration try to maximize their gains through a large administration that becomes inefficient.

To sum up, many countries in Africa try to reap benefits from preferential integration by entering several agreements. But as the rules of the agreements overlap, the multiple memberships are likely to limit the implementation of preferential integration and increase transaction costs in trade. If the effect of PTA membership is reduced by a spaghetti bowl situation, the spaghetti bowl indirectly may have a negative impact on trade. The spaghetti bowl is applicable to PTA proliferation in general but is likely to be more problematic in Africa and developing countries, due to low institutional capacity. The spaghetti bowl effect on preferential integration is not only an effect of overlapping memberships within Africa, but also partly created by agreements with countries outside the continent.

3.2. Definition of the spaghetti bowl for this thesis

In this thesis, the spaghetti bowl will be defined as a situation when a country is a member of at least two PTAs, as this is enough for the problems related to conflicting rules and commitments to arise. In this study the base definition of the spaghetti bowl includes both extra-Africa and intra-Africa PTAs. However, in the empirical study a sample including only the intra-African agreements is also considered, as it could be an interesting distinction to make.

Due to the limitations of this essay and to ensure that the agreements included in the analysis are in force and not only under construction, the PTAs used in this essay are limited to those notified to the WTO and listed in the WTO database on regional integration agreements (RTA-IS, WTO 2011). There are a large amount of RTAs present in Africa today and not all of them are mentioned in the database chosen and hence not notified to the WTO. Some of these agreements have not made any progress towards removal of internal trade barriers (UNECA 2011). Some of these non-notified agreements are in progress, but a WTO notification seemed as proper criteria to select the set of African agreements in force. The intra-Africa agreements selected is presented in figure 1.

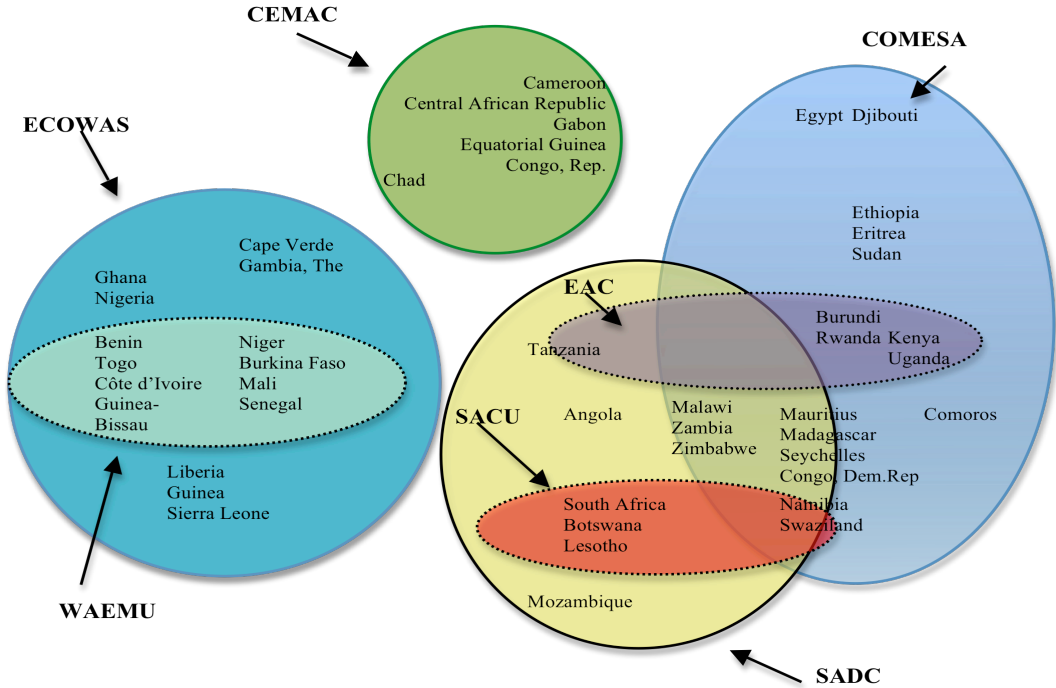


Figure 1: The Spaghetti Bowl - overlapping regional integration agreements in Africa
 COMESA, Common Market of Eastern and Central Africa; CEMAC, Economic and Monetary Community of Central Africa; ECOWAS, Economic Community of West African States; WAEMU, West African Economic and Monetary Union; SADC, Southern African Development Community; SACU, Southern African Customs Union

Own figure, based on the Regional Trade Agreements Information System (RTA-IS) database (WTO 2011),
<http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx>

Preferential trade agreements with the rest of the world listed in the WTO database are included in the analysis, as these may contribute to administrative difficulties and therefore also might have an indirect effect on intra-Africa trade. The agreements included are only those listed in the WTO database on RTAs, and hence not all GSP-agreements are included. The agreements listed in the database are agreements with the EU, EFTA, Turkey and the US. Two larger FTAs including non-African countries are also considered; the Pan-Arab Free Trade Area (PAFTA) and the Protocol on Trade Negotiations (PTN). The special WTO rules for trade agreements between developing countries (the GSTP) will also be included in the sample as it may contribute to the spaghetti bowl (see section 3.2) as it is listed as an agreement in the database and 14 African countries are members.

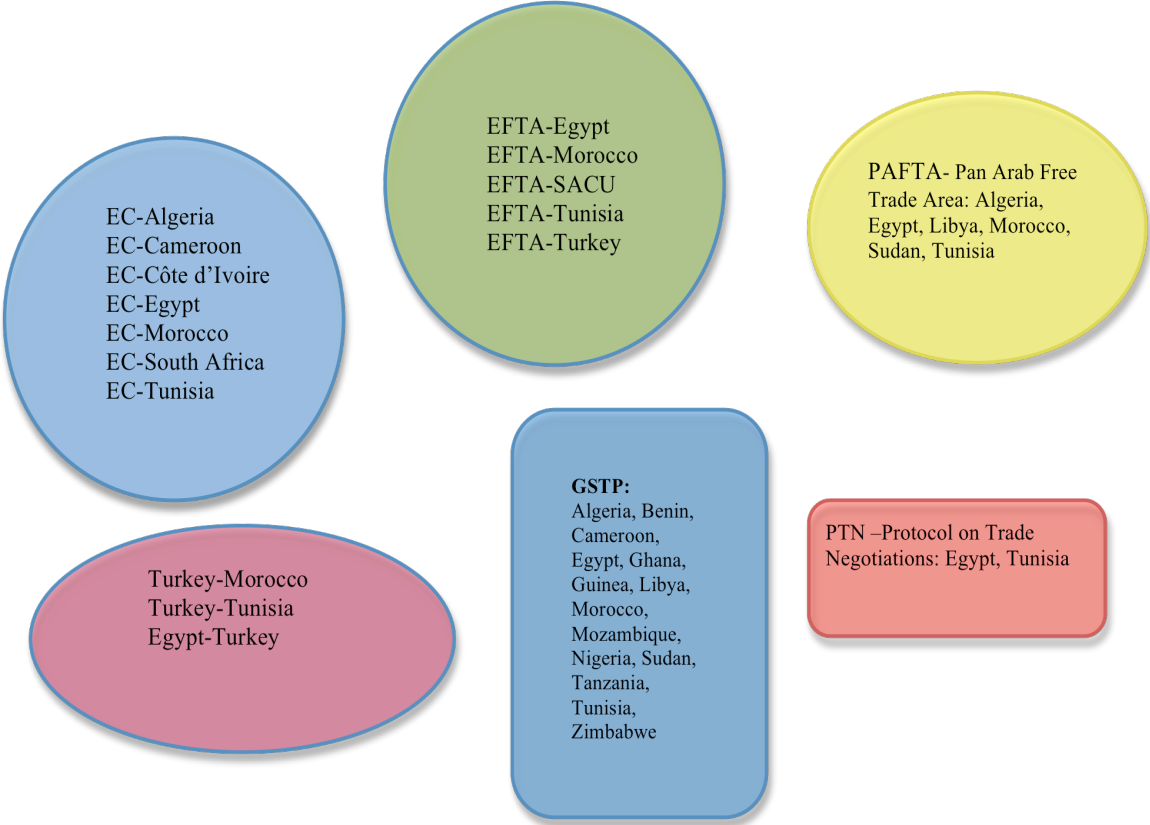


Figure 2: Preferential trade agreements with non-African countries.

Own figure based on the Regional Trade Agreements Information System (RTA-IS) database (WTO 2011),
<http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx>

3.3. The spaghetti bowl in numbers

The highest number of notified agreements per country is 7 (Egypt) and the lowest 0 (Mauretania, Somalia and Sao Tomé and Príncipe). The mean value of agreements per country is 2.15 agreements, covering both North-South and South-South agreements. In the figure all agreements listed in the RTA-IS database (WTO 2011) is included.

Table 1: The spaghetti bowl in numbers (both extra-Africa and intra-Africa PTAs)

Number of PTAs	Number of countries
0	3
1	14
2	20
3	11
4	2
5	0
6	2
7	1
Max number of PTAs/country	7
Least number of PTAs/country	0
Mean value	2.15

Source: WTO – Regional Trade Agreements Information System (RTA-IS) database,

<http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx>

All intra-African trade agreements except SADC are customs unions and all extra-African PTAs are defined as free trade areas. Both trade deflection and conflicting tariffs rates may thus be problematic for the countries involved. The agreements studied cover only goods, except the FTA between the US and Morocco which also includes services. The study will not define the types of goods traded and the particular circumstances in each overlap (such as exact tariff rates and rules of origin).

Table 2: Intra-Africa preferential trade agreements

Abbreviation	Full name	Type of agreement
COMESA	Common Market of Eastern and Southern Africa	CU
ECOWAS	Economic Community of West African States	CU
SACU	South African Customs Union	CU
CEMAC	Economic and Monetary Community of Central Africa	CU
WAEMU	West African Economic and Monetary Union	CU
EAC	East African Community	CU
SADC	Southern African Development Community	FTA

Source: WTO – Regional Trade Agreements Information System (RTA-IS) database, <http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx>

Table 3: Extra-Africa preferential trade agreements

Name of agreement	Type of agreement and year of entry into force
EC-Algeria	FTA
EC-Cameroon	FTA
EC-Egypt	FTA
EFTA-Egypt	FTA
Egypt-Turkey	FTA
EC-Côte d’Ivoire	FTA
EFTA-SACU	FTA
EC-Morocco	FTA
EFTA-Morocco	FTA
Turkey-Morocco	FTA
US-Morocco	FTA
EC-Tunisia	FTA
EFTA-Tunisia	FTA
Turkey-Tunisia	FTA

Source: WTO – Regional Trade Agreements Information System (RTA-IS) database, <http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx>

Table 4: Larger preferential trading blocs including African countries

Name of agreement	Type of agreement and year of entry into force
PAFTA (Pan-Arab Free Trade Area)	FTA
PTN- Protocol on Trade Negotiations	Partial Scope Agreement

Source: WTO – Regional Trade Agreements Information System (RTA-IS) database, <http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx>

4. Econometric methodology

To assess the impact of the spaghetti bowl, a gravity model is estimated. The model is extended with dummy variables that capture the potential trade effects of preferential integration and overlapping trade agreements. This section includes a description of the model and predicted econometric results. It also discusses the data and description of the spaghetti bowl variables.

4.1. Description and specification of the gravity model

The gravity model relies on the gravity theory of international trade that determines bilateral trade as a result of attracting and opposing forces. Bilateral trade is the dependent variable in the gravity model and is determined by countries' economic and demographic size and their geographic situation. GDP (economic mass) is the major attracting force in the model and the main opposing force is distance (economic resistance). The idea of the gravity model is borrowed from Newton's theory of gravity in physics that explains how physical bodies attract in relation to their mass. To assess the impact of economic and demographic size GDP and GDP per capita are included in the model. To capture distance and transport costs between the countries, bilateral distance is included. Geographic situation is commonly also captured by a dummy variable that indicates whether a country is landlocked or not and one that shows if the countries share a border. Cultural relationship between the countries in the country pair is captured by dummy variables for common language and common colonizer. (An exact definition of the variables can be found in the appendix to this study).

According to Bergstrand (1989), Carrère (2002) and Greenaway and Milner (2002), the gravity model is appropriate for assessing the effects of regional integration. In this estimation of the model, dummy variables are added to capture the effects of preferential integration and of the spaghetti bowl.

The original formal definition of the gravity model is a multiplicative model, specified as:

Equation 1:

$$M_{ijt} = \exp(\beta_1)GDP_{it}^{\beta_2}GDP_{jt}^{\beta_3}GDPcap_{it}^{\beta_4}GDPcap_{jt}^{\beta_5}Dist_{ij}^{\beta_6} \exp(\beta_7Border_{ij} + \beta_8Language_{ij} + \beta_9Colony_{ij})\epsilon_{ijt}$$

M_{ijt} indicates the bilateral trade flow between country i and country j at time t , and according to the gravity model this flow can be explained by following explanatory variables. As cross sectional data for only one year is used in this particular survey, the time index t can be eliminated from the equations. Normally the gravity model is log-linearized, which makes the model additive. The definition of the model then looks like this:

Equation 2:

$$\ln M_{ijt} = \beta_1 + \beta_2 \ln GDP_i + \beta_3 \ln GDP_j + \beta_4 \ln GDPcap_i + \beta_5 \ln GDPcap_j + \beta_6 \ln Dist_{ij} + \beta_7 Border_{ij} + \beta_8 Language_{ij} + \beta_9 Colony_{ij} + \epsilon_{ij}$$

In this specification of the model a dummy variable for whether a country is landlocked or not has been added to the model, as this is an important trade determinant and is extra relevant for Africa that has many landlocked countries. The definition of the gravity model then looks like this:

Equation 3

$$\ln M_{ijt} = \beta_1 + \beta_2 \ln GDP_i + \beta_3 \ln GDP_j + \beta_4 \ln GDPcap_i + \beta_5 \ln GDPcap_j + \beta_6 \ln Dist_{ij} + \beta_7 Border_{ij} + \beta_8 Language_{ij} + \beta_9 Colony_{ij} + \beta_{10} Landlocked_i + \beta_{11} Landlocked_j + \epsilon_{ij}$$

4.2. Incorporating the spaghetti bowl into the gravity model

A modelling of the spaghetti bowl effect in a gravity model has to the best of my knowledge not been done before and there might be several ways to measure the phenomenon. An

appropriate way to assess the effect seems to be to create dummy variables that are incorporated into the gravity model. In this study, two such variables have been created and added to the model. The first picks up the trade effect of a PTA. It takes the value 1 if the parties in the country pair have signed at least one PTA with each other and 0 otherwise. The variable measures the effect of a PTA membership and gives the model following expression:

Equation 4:

$$\begin{aligned} \ln M_{ijt} = & \beta_1 + \beta_2 \ln GDP_i + \beta_3 \ln GDP_j + \beta_4 \ln GDP_{cap_i} + \beta_5 \ln GDP_{cap_j} \\ & + \beta_6 \ln Dist_{ij} + \beta_7 Border_{ij} + \beta_8 Language_{ij} + \beta_9 Colony_{ij} \\ & + \beta_{10} Landlocked_i + \beta_{11} Landlocked_j + \beta_{12} PTA_{ij} + \varepsilon_{ij} \end{aligned}$$

The second dummy variable takes the value 1 if one (or both) of the countries in the bilateral couple has signed an agreement with a third country, and 0 otherwise. The dummy variable can be called the spaghetti bowl variable and shows whether bilateral trade is affected by a country entering additional agreements with a third country. The hypothesis is that the spaghetti bowl affects trade negatively through lowering the PTA effect. To assess this particular effect, the spaghetti bowl variable is interacted with the PTA-dummy and it is through this interaction effect the spaghetti bowl effect enters the model. The model is thus extended to following expression:

Equation 5:

$$\begin{aligned} \ln M_{ijt} = & \beta_1 + \beta_2 \ln GDP_i + \beta_3 \ln GDP_j + \beta_4 \ln GDP_{cap_i} + \beta_5 \ln GDP_{cap_j} \\ & + \beta_6 \ln Dist_{ij} + \beta_7 Border_{ij} + \beta_8 Language_{ij} + \beta_9 Colony_{ij} + \beta_{10} Landlocked_i \\ & + \beta_{11} Landlocked_j + \beta_{12} PTA_{ij} + \beta_{13} (PTA_{ij} \times Spaghettibowl) + \varepsilon_{ij} \end{aligned}$$

The coefficients for the PTA-dummy and the interacted variable should be interpreted as:

β_{12} = the trade creating effect of a PTA

β_{13} = the effect of the spaghetti bowl variable on the PTA effect (for observations where both the PTA-dummy and the spaghetti bowl dummy equals 1).

When the spaghetti variable equals 0, the interacted dummy equals 0, which implies that it represents the effect captured by the coefficient for the PTA dummy. The original PTA-

dummy may include more than one agreement as it only states that two countries have some kind of bilateral trade preferences. The spaghetti bowl variable is created with this possibility in mind and does not include any agreements that are already captured by the PTA-dummy.

The spaghetti dummy was specified in two ways to enhance the robustness of the estimation. In the first definition, only one PTA with third country is enough for the dummy variable to equal 1. The second definition is sharper and at least two PTAs with third country are needed for the dummy variable to equal 1. In the baseline regression, the first definition is used and the second is used in one of the robustness regressions. The differences in the variables between the definitions are presented below:

Table 4: Definitions of the spaghetti bowl variable

	Total sample (2756 country pairs)	Sample excluding zero trade flows (1696 country pairs)
Number of PTA in bilateral couples	733	523
Number of variables that equaled 1 in first definition of the spaghetti bowl	615	450
Number of variables that equaled 1 in second definition of the spaghetti bowl	359	285

In this study, the gravity model is estimated in E-views with the OLS (Ordinary Least Squares) estimator. Before estimating the regression, the expected result from the estimation of the extended gravity model is summarized in table 4. The most important hypothesis is that the spaghetti bowl variable has a negative impact on the effect of preferential integration and hence that the effect of the interacted variable is negative.

Table 5: Expected results from gravity model estimation

Variable	Expected effect on bilateral trade flows	Explanation of expected result
GDP (Gross Domestic Product)	+	Large economies tend to trade more than small economies, thus GDP is expected to have a positive effect on trade
GDP per capita	+/-	GDP per capita measures development level and is expected to have a positive impact on trade. But it can also be a measure of population size, which has an ambiguous effect on trade.
Distance (distance between capitals)	-	Distance between two countries increases the transport costs, which should affect trade negatively
Border	+	If the countries share a common border, the trade effect is expected to be positive due to low transport costs.
Language	+	A common language facilitates communication and is expected to have a positive effect on trade.
Colony (common colonizer)	+	A mutual colonial history is expected to effect trade positively as it denotes cultural boundaries that lower transaction costs.
PTA-dummy	+	A PTA between two countries is expected to have a positive effect on trade.
PTA-dummy × Spaghetti bowl dummy (interacted variable)	-	Being a member of multiple PTAs is expected to have a negative impact on the effect of preferential integration based on the theoretical discussion above.

4.3. Data

The data set used in the study covers bilateral trade flows in Africa for 2010. Data for all Africa's 53 countries are used and the sample consists of 53 times 52, hence 2756 bilateral pairs. All data are collected from well-known agents in the global economy. A notorious problem when working with developing countries is the lack or poor quality of data, and this is also the case when it comes to trade data. Some countries do not report their trade and it is

also important to remember that informal trade is likely to be large-scale. In this essay, trade data from 2010 is used even though it suffers from gaps in the data. One way to tackle the problem with missing data would be to use older data, but in this case even older data are incomplete. Therefore the 2010 data set is kept. As there is no previous empirical study on the spaghetti bowl phenomenon, this essay offers a simple framework that can serve as a basis for future research and is estimated on cross-sectional data for one year.

The data on bilateral trade flows is downloaded from UN Comtrade (2011). Import data can be regarded as the most reliable data when working with developing countries' trade. Countries gain tariff revenue from imports and hence the imports tend to be more carefully documented. The data used in the study is as far as possible based on import data. When import data was not reported, export data was used instead as it is desirable with such a large sample as possible. The total sample used consists of 2756 bilateral pairs, whereof trade is reported for 1696 observations. Out of these, import data is reported for 1220 observations and for the rest, 476 observations, export data has been used to extend the sample. 1060 observations are zero trade flows between countries where no trade data could be found. The problem with these cases is that we do not know if the countries really do not trade or if the zero is just a consequence of missing report.

A problem when omitting the observations with zero trade flows is that the effects of the explanatory variables not necessarily are similar to those of the observations included in the sample, and hence potentially important effects is excluded. For example, it is possible that the spaghetti bowl effect is a contributing factor to zero trade flows and in that case parts of the effect is missed out. The baseline regression is therefore run on a sample with only positive trade flows, but in the robustness regressions I also include the zeroes. To run the baseline regression only on positive trade flows implies on one hand that the sample is reduced, but on the other hand the uncertainty created by the zero trade flows is avoided. In the robustness regressions including the zeroes, they are given the value 0.00001 in the data set as the model used will be log-linearized and the logarithm of 0 is not defined.

The spaghetti bowl of African regionalism has not been estimated econometrically before and therefore I created own variables (see previous section) to assess the impact of agreement overlaps based on information from the WTO database on regional trade agreements (WTO 2011). The data also includes data for the variables in the gravity model on GDP and GDP per

capita and bilateral variables for distance between capitals, common border, common language, landlocked and common colonizer. GDP data was downloaded from World Bank Indicators (World Bank 2011). GDP data for Djibouti, Libya and Somalia were missing in the data from the World Bank, and instead they were downloaded from UN Data (2011). No data for 2010 could be found for these specific values, and hence data for 2009 was used.

For measuring bilateral distance between countries in a country pair, a variable that measure distance between capitals is used, as the capital can be assumed to be the centre of economic activity in a country. Transaction costs effects of a common language are captured by a dummy variable that shows if the countries share a common official language. Cultural similarities rooted in colonial history are captured by a dummy variable that shows whether the countries have had a common colonizer with each other or not.

5. Assessing the trade impact of the spaghetti bowl

In following section, the results from the empirical study are presented and commented. The section also includes a robustness regressions and a sensitivity analysis, to see that the results are robust. The essay is rounded off by a discussion of the results.

5.1. Econometric study and results

The results from all regressions are presented in table 6 below. All regressions are based on equation 5 (except for regression 1 that is based on equation 4). The baseline regression is regression 2 and includes both extra-Africa and intra-Africa agreements. Regression 3 only includes the intra-Africa agreements, and is also commented in the first part of the analysis as the distinction between the regression with all agreements and the one with only intra-Africa trade agreements might be interesting to make. Both these regressions are run on the sample with only positive trade flows. Regressions 4 to 6 are robustness regressions and are commented in the sensitivity analysis. The complete results from the study are discussed in the last section of the chapter.

Table 6. Regression results

Variable	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5	Regression 6
GDP Importer	0.62 (0,00)***	0.63 (0,00)***	0.62 (0,00)***	2.10 (0.00)***	0.59 (0.00)***	2.10 (0.00)***
GDP Exporter	0.99 (0,00)***	0.99 (0,00)***	0.99 (0,00)***	2.35 (0.00)***	0.96 (0.00)***	2.35 (0.00)***
GDP per capita importer	-0.13 (0,06)*	-0.13 (0,06)*	-0.12 (0,08)*	-0.78 (0.00)***	-0.15 (0.03)**	-0.46 (0.00)***
GDP per capita exporter	0.16 (0,02)**	0.16 (0,02)**	0.16 (0,02)**	-0.46 (0.00)***	0.14 (0.05)*	-0.78 (0.00)***
Bilateral distance	-1.51 (0,00)***	-1.48 (0,00)***	-1.51 (0,00)***	-1.24 (0.00)***	-1.60 (0.00)***	-1.28 (0.00)***
Landlocked importer	-0.73 (0,00)***	-0.74 (0,00)***	-0.72 (0,00)***	-1.24 (0.00)***	-1.60 (0.00)***	-1.28 (0.00)***
Landlocked exporter	-1.24 (0,00)***	-1.25 (0,00)***	-1.24 (0,00)***	-1.37 (0.00)***	-1.26 (0.00)***	-1.39 (0.00)***
Common border	1.25 (0,00)***	1.22 (0,00)***	1.25 (0,00)***	-0.36 (0.61)	1.14 (0.00)***	-0.31 (0.66)
Common language	0.62 (0,00)***	0.62 (0,00)***	0.64 (0,00)***	1.63 (0.00)***	0.14 (0.44)	1.61 (0.00)***
Common colonizer	0.14 (0,46)	0.14 (0,46)	0.12 (0,46)	1.63 (0.00)***	0.14 (0.44)	1.61 (0.00)***
PTA-dummy	1.46 (0,00)***	2.31 (0,00)***	1.58 (0,00)***	2.49 (0.00)***	0.63 (0.01)**	2.43 (0.00)***
PTA × Spaghetti Bowl (interacted variable)	-	-0.95 (0,00)***	-0.19 (0,45)	0.48 (0.59)	1.37 (0.00)***	0.53 (0.42)
R ²	0.44	0.45	0.45	0.38	0.46	0.38
P-value	(0,00)***	(0,00)***	(0,00)***	(0.00)***	(0.00)***	(0.00)***

(Significance levels: p<0,1=*; p<0,05=**, p<0,01***)

The coefficients of determination R² are quite low for being gravity regressions, between 0.38 and 0.46. A low R² value means that the explanatory variables included in the regression do not completely describe the value of the dependent variable. It might be the case that the

gravity model is not an optimal tool to predict trade flows within Africa and that other factors not captured in the model affect trade flows. The coefficients of the continuous variables in the regressions can be interpreted as elasticities, i.e. the effect in % on the dependent variable (bilateral trade) if a continuous explanatory variable (e.g. GDP) increases with 1 %. To calculate the gross trade creating effect of a dummy variable the $(e^{\beta} - 1) \times 100$ formula can be used.

The first regression is based on equation 4 and includes control variables for the gravity model and the PTA-dummy and is run to test the basic gravity model and the PTA-dummy. The hypothesis for the PTA-dummy is that a PTA has a positive effect on bilateral trade. Before adding the spaghetti bowl effect to the model, the control variables for the gravity model are commented.

GDP is a core determinant in the gravity model and has the expected significant positive sign. This is consistent with the predictions of the model; large economies tend to trade more than small and *GDP* can be considered a measure of a country's propensity to import. *GDP per capita* is negative and significant at 10% significance level for the importing country and positive and significant at 5% significance level for the exporting country. The interpretation of *GDP per capita* is a bit more complicated and the variable has shown to have an ambiguous effect on trade. *GDP per capita* could be considered a measure of development level in a country and be expected to have a positive coefficient, as for the exporter. For the importer, the coefficient for *GDP per capita* is negative. The variable can also be considered as a measure of population size. The larger the population the smaller, *ceteris paribus*, the *GDP per capita*. Hence the propensity to import is likely to be lower and the variable may have a negative effect on trade.

The *distance* variable has the expected significant and negative coefficient. This is consistent with the predicted negative impact of poor infrastructure and high transport costs on intra-Africa trade (see section 2.2.3). Long distance means higher transport costs and less trade. The *border* dummy on the other hand is as expected positive and significant. The *landlocked* variables show a significantly negative coefficient. This is also consistent with the theoretical predictions.

The coefficient for *common language* is positive and significant as expected. A common language facilitates economic cooperation as communication becomes easier and thus the transactions costs fall. On the contrary, *common colonizer* is insignificant in the regression, and hence common colonizer does not seem to be an important trade determinant in this particular sample. Another possibility is that the language variable captures both culture-related effects.

After running the first regression, the interacted variable was added to the model and the rest of the regressions are based on equation 5. Below, the results from the baseline regression (regression 2) are commented. Comments on regression 3 that include only the intra Africa agreements is found in the end of this section. The results for control variables for these regressions are not further commented as they are similar to regression 1.

The coefficient for the PTA-dummy equals 2.31 in regression 2 and the p-value 0.00, which means that the variable is positively significant at 1 % significance level. This implies that country pairs that have signed a PTA trade more than pairs that have not. By using the β -value for the PTA-dummy, the gross trade creation indicated by the dummy amount to about 900 %. Countries that are members of a mutual PTA trade 900 % more with each other than countries that have not signed a PTA according to this estimation.

The most interesting variable to interpret for this study is the interacted variable (the PTA-dummy times the spaghetti bowl dummy). In regression 2, the coefficient for the variable is negative, -0.95, and significant at 1 % significance level. The variable measures the effect of the spaghetti bowl on the PTA effect. The regression result supports the hypothesis that being a member of several trade agreements has a negative impact on the effect of PTAs and thereby on trade. The effect of a PTA in a country pair is thus negatively affected when at least one of the parties have signed an agreement with a third country.

The coefficient values for the PTA dummy in the regressions are very high, especially with respect to the discussion about the low performance of African PTAs. It may depend on that unobserved heterogeneity affects the variable coefficient, which can be a problem when working with cross-sectional data. The time variance explanation mentioned above may also cause this high coefficient value. Sometimes, the specification of the distance variable may

result in too high coefficients for the PTA-dummy, as some countries tend to “over-trade” in relation to bilateral distance (Greenaway & Milner 2002).

In regression 3 the interacted variable turns out to be insignificant. No support for a negative impact of the spaghetti bowl on the PTA-effect can hence be found when the spaghetti bowl only includes the intra-Africa agreements. No evidence is hence provided for a negative effect of overlaps of agreements within Africa. In regression 3, the coefficient for the PTA-dummy is positive, 1.58, and significant. If the $(e^{\beta} - 1) \times 100$ formula is used, the gross trade creating effect from the intra-Africa agreements is 400 %. As in the baseline regression, the coefficient value is high. The results for the control variables for the regression are similar to those for the baseline regression.

To sum up, the spaghetti bowl effect on the PTA-effect is negative and significant when the extra-Africa agreements are included in the analysis but no significance was found when including only intra-African agreements. The control variables for the gravity model were consistent with expectations for all regressions. Important to remember is that the regressions commented are run only on positive trade flows, which implies that the effects from the observations with zero trade flow is missing.

5.2. Sensitivity analysis

5.2.1. Sensitivity regressions and results

Table 6 includes three robustness regressions. For the baseline regression, two sensitivity regressions were run to test whether the significant result for the interacted variable is robust. The first sensitivity regression, number 4, includes all agreements and is run on a sample that includes the observations with zero trade values. Regression 5 was run using a sharper definition of the spaghetti bowl variable to see if the result for the interacted variable is affected when sharpening the spaghetti bowl criteria. One extra regression was also run on regression 3 although no significant result was found, where the zeroes were included (regression 6). In this section, the results from the sensitivity analysis are presented. A more elaborate discussion of the regression results can be found in section 5.3 below.

First, the robustness regressions for the baseline regression are commented. In the sensitivity regression where the zeroes were included in the sample (regression 4), the interacted variable

turned out to be insignificant. However, the uncertainty caused by the missing data makes the result rather unreliable.

In the sensitivity regression 5, the second definition of the spaghetti bowl was used and then the coefficient for the interacted variable turned out to be positive and significant. The changed coefficient sign was indeed surprising with respect to earlier results. Country-specific effects that are not included in the model may cause the finding and are further discussed below.

The sensitivity regression run on regression 3 (where only the intra-Africa agreements are included) was run on a sample where the observations with zero trade flows are included, and gave no different result for the variables of interest (see regression 6). The interacted variable was found to be insignificant even though the zeroes were included.

In sum, the robustness regressions on the baseline regression gave slightly confusing results for the interacted variable. The results for the PTA-dummy were consistent through all regressions.

5.2.2. Tests and inference reliability

An important point to keep in mind when working with cross-sectional data is that the lack of time-variance makes it hard to predict causal effects. Therefore it is more appropriate to talk about correlations between the variables, rather than explicit causal effects.

Another problem when working with cross-sectional data is that it is hard to control for unobserved heterogeneity. Hence country-specific effects that may affect the results are not included in the model. The unobserved heterogeneity may result in too high coefficient values, which is likely to be the case for the PTA-dummy coefficient. One way to solve the problem caused by unobserved heterogeneity in cross-sections is to use panel data techniques. As the data set used includes a bilateral dimension a fixed effect model with importer- and exporter effects might have resulted in more robust results, but to do that was beyond the time limit of this project.

Two of the sensitivity regressions were run on a sample including the observations with zero trade flow. A problem occurs when the dependent variable includes zero values as the

logarithm of zero is not defined. This problem can be avoided in several ways. One way is to estimate the gravity model in a multiplicative form using the Poisson Pseudo Maximum Likelihood estimator, which accepts the zero values.³ However, this method can be considered a bit too advanced for a bachelor thesis and is not used here. Another way to solve the problem is to exclude the zero values from the sample, which was the method chosen in the original sample of this essay. In the third sensitivity regression, the zeroes were included and in this estimation the zero values were given a value of 0.00001, which is a third solution to the problem. Then the logarithm is defined and the model can be properly estimated.

A common problem when using cross sectional data is heteroscedasticity, which means that the variance for the error term ε is different for different observations and may lead to incorrect inference (Westerlund 2005, p. 173). A White's heteroscedasticity test showed that the data suffered from heteroscedasticity, and therefore the model has been estimated using White's consistent standard errors and covariance that can be used even though the residuals are heteroscedastic (Westerlund 2005, p.176).

When estimating a multiple regression, it is important to make sure that the variables are not collinear. Collinearity is when the variables systematically depend on each other. If the variables are collinear it can be hard to separate the effect of the different variables and thus it may lead to incorrect inference. To test for collinearity Variance Inflation Factors (VIF) can be used (Westerlund 2005, p. 159-160). When running a VIF-test on the estimated variables, no sign of collinearity could be found.

5.3. Discussion of results

The purpose of the empirical study was to assess the effect of the spaghetti bowl on preferential integration. The study cannot find any robust evidence for the hypothesis of a negative trade effect caused by the spaghetti bowl phenomenon on the PTA effect, as the results provide unclear results for the interacted variable. Although a negative significant result was found for the baseline regression, it is problematic to draw far-reaching conclusions

³ Using the Poisson Pseudo Maximum Likelihood method has for example been suggested by Santos Silva and Tenreiro 2011.

from this, as the robustness regressions indicate that the spaghetti bowl effect in the regression seems to be sensitive for changes.

The results discussed in the first part of the analysis show a tendency towards a negative effect of the spaghetti bowl on preferential trade as a negative significant result was found when running the baseline regression. However, when omitting the extra-Africa PTAs, the variable did not show any statistic significance. Even though the spaghetti bowl phenomenon is argued to be enhanced by extra-Africa agreements it is also often mentioned as an intra-Africa PTA problem, which makes the insignificant coefficient extra interesting. It would be interesting to investigate further, whether it is the extra-Africa agreements that generate the negative effect on preferential integration, as the number of trade agreements between Africa and the rest of the world is likely to increase and African countries deepen their participation in the multilateral trading system.

The robustness regressions on the baseline regression presented confusing results for the spaghetti bowl effect. When including the zero trade flows (regression 4) the coefficient for the interacted variable becomes insignificant. As the sample included many zeroes, the regression results should be interpreted with caution. As it is hard to say whether the zeroes are “real” zero trade flows caused by trade barriers and transaction costs or are just not reported the sample is rather unreliable and makes it hard to interpret why the interacted variable becomes insignificant. At a first glance, the sample with the zeroes could be assumed to increase the spaghetti bowl effect on the PTA-effect, as the effect might contribute to zero trade. One possibility is that country-specific effects not included in the model might explain the insignificant coefficient for variable.

When the second definition of the spaghetti bowl is used (regression 5), the sign of the coefficient for the interacted variable changes but is still statistically significant. The result is surprising based on the theoretical discussion of the spaghetti bowl effect and also with respect to the result from the original regression. The result could be yet an indication of that the problems related to the spaghetti bowl are closely related to country-specific effects that are not captured in the model, such as institutional quality and administration capacity. It is possible that some countries possess a larger administrative capacity and institutional capital than others and hence may reap benefits from multiple agreement membership.

This empirical study is based on cross-sectional data as it was intended as a simple basis for future research. However, as mentioned in the discussion above, it is possible that country-specific effects not controlled for cause parts of the inconsistency in the results. One way that might generate a more consistent result for the interacted variable would be to clear the sample from potential disturbing country-specific effects. One method might be to run the regression using panel data techniques, for example a fixed effect method and see if the results become more robust. To use data with a time series dimension might also generate different results. To do this is passed on to future research as it was beyond the time limit of this essay. It is also important to remember that another method not necessarily would have generated robust results.

A more complete data set might also have improved the robustness of the study and minimized the risk of unreliable inference caused by missing data. But as mentioned above, missing and poor quality data is ubiquitous while working with developing countries and it would be hard to find a data set that do not suffer from gaps.

Accordingly, it is difficult to make any strong statements about the spaghetti bowl effect based on this study. But the mixed result does not, however, mean that the administrative complexities and transaction costs created by conflicting set of rules are not a relevant issue, only that this study could not present any robust evidence of its impact on preferential integration. Overlapping regional agreements might still affect the implementation process negatively, even though no statistically significant effect on regional integration and hence trade could be found. The survey result presented by Tavares and Tang (2011) cited in the theoretical discussion can still serve as an indicator of the implementation problems related to overlapping agreements. It might be the case that more streamlined agreement rules should facilitate the implementation process and improve the overall performance of African regionalism.

Finally, some conclusions can be drawn from the theoretical discussion and the regression results. The PTA-dummy is positive and significant in all regressions, and hence preferential integration has a statistically significant positive impact on trade according to this study. The distance variable is negative and significant in all regressions, which supports the theoretical predictions that poorly developed infrastructures are an important obstacle to intra-Africa trade. Even the negative and significant coefficients for the landlocked variables support this

argumentation. Lack of institutional capacity and poor infrastructure must be seen as prominent impediments to intra-Africa trade. As long as those hindrances are present, trade within Africa is likely to remain low. The concept of trade facilitation is hence a highly relevant issue. As the spaghetti bowl phenomenon is related to these hindrances, it should still be considered an important problem.

6. Summary and concluding remarks

The aim of this essay was to describe the spaghetti bowl phenomenon in Africa and assess its impact on preferential trade. The description of the spaghetti bowl indicates that there are agreement overlaps in Africa that are likely to lower the performance of preferential integration. Both extra-Africa and intra-Africa agreements can be argued to affect the implementation process of PTAs in Africa. When the spaghetti bowl was assessed econometrically, a gravity model was estimated with two additional variables that capture the effect of PTA membership and of the spaghetti bowl. The study could not find any robust statistical evidence for trade impact of the spaghetti bowl phenomenon, but this must not necessarily be interpreted as an undermining of the spaghetti bowl theory, which still could be considered relevant and important.

As the problem of overlapping PTAs still can be assumed to create implementation problems, especially for developing countries, it is an important issue to address when discussing developing country policy. From a spaghetti bowl perspective, it is important to try to make the rules of existing agreements more matching. Moreover, to keep new trade deals compatible with already existing agreements can be considered essential. This accounts both for agreements on a bilateral and multilateral level. The concept of trade facilitation is also central when discussing trade procedures in Africa, and to form more simple trade agreements and to streamline rules might be a part of the process.

However, if policies addressing the spaghetti bowl issues should be as efficient as possible, it is important to approach institutional deficits. To develop institutional capital and administrative qualities in developing countries crucial when integrating their economies in world trade and the global web of trade agreements. For the African economies, investment in infrastructure is a key to successful trade and economic integration within the continent. Of course, this is connected to developing institutions, as a stable institutional framework is a condition for successful implementation of development projects. On this area, cooperation with developed countries might be beneficial as they may provide developing countries with resources and help to create strategies for long-term economic development.

The importance of the spaghetti bowl and also the ambiguous results could provide incentives for further examination of the spaghetti bowl phenomenon. As this estimation is the first of its

kind, there is room for future research. As the administrative difficulties facing developing countries as a consequence of PTA proliferation still may be a problem despite the findings of this essay, it is an important area to improve and a crucial part of easing developing countries' trade and economic integration. Some suggestions for further research would be to use panel data techniques or time series data to see if the results turn out to be more robust. To explore the different impacts of intra-Africa agreements and extra-Africa agreements more elaborately, might also be of interest. It would also be interesting to discuss the spaghetti bowl theory in relation to another set of countries. Another interesting study would be to break down the spaghetti bowl into smaller fragments and analyse particular cases of overlapping agreements. This would allow for a more detailed discussion of for example conflicting tariff rates and trade deflection.

Important to remember is that other econometric methods and data sets not necessarily would provide a more robust result. But as the spaghetti bowl phenomenon is of great practical relevance when discussing African trade agreements, it would be worth to do additional studies on the subject. It would also be interesting to change the sample and discuss the spaghetti bowl phenomenon on another continent or another group of countries.

In sum, it is hard to draw any far-reaching conclusions on the spaghetti bowl effect on the performance of preferential integration. This study have provided a description of the spaghetti bowl and made an empirical study of its impact. As no robust conclusions can be drawn, future research on the subject is encouraged.

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Appendix

I. Map of Africa



Source: <http://en.wikipedia.org/wiki/File:AfricaCIA-HiRes.jpg>

II. Exact definitions of control variables for the gravity model estimation

Variable	Definition	Comments
GDP_i	GDP for country i	
GDP_j	GDP for country j	
GDP_{cap_i}	GDP per capita for country i	
GDP_{cap_j}	GDP per capita for country j	
Distance	Bilateral distance between country i and country j	<i>In the data used, the $distcap$ variable from CEPII is used, that measure bilateral distance between capitals.</i>
Border	Dummy variable that takes the value 1 if the countries share a border and 0 otherwise	
Language	Dummy variable that takes the value 1 if the countries share a border and 0 otherwise	<i>The gravity data from CEPII (2011) also includes a variable for ethnic languages, but to use the variable for official language seemed proper for this essay</i>
Colony	Dummy variable that takes the value 1 if the countries share colonial history and 0 otherwise	<i>The file from CEPII that is used is called $comcol$ and indicates whether the countries have had a common colonizer.</i>
$Landlocked_i$	Dummy variable that takes the value 1 if country i is landlocked and 0 otherwise	
$Landlocked_j$	Dummy variable that takes the value 1 if country j is landlocked and 0 otherwise	

III. Complete list of members of included agreements

Abbreviation	Full name	Members
COMESA	Common Market of Eastern and Southern Africa	Burundi, Comoros, Congo DR, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Zambia, Zimbabwe
ECOWAS	Economic Community of West African States	Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo
SACU	South African Customs Union	Botswana, Lesotho, Namibia, South Africa, Swaziland
CEMAC	Economic and Monetary Community of Central Africa	Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea, Gabon
WAEMU	West African Economic and Monetary Union	Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, Togo
EAC	East African Community	Burundi, Kenya, Rwanda, Tanzania, Uganda
SADC	Southern African Development Community	Angola, Botswana, Congo DR, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe
PAFTA	Pan-Arab Free Trade Area	Algeria , Bahrain, Egypt , Iraq, Jordan, Saudi Arabia, Kuwait, Lebanon, Libya , Morocco , Oman, Qatar, Sudan , Syria, Palestine, Tunisia , United Arab Emirates, Yemen
PTN	Protocol on Trade Negotiations	Bangladesh, Brasil, Chile, Egypt , Israel, Republic of Korea, Mexico, Pakistan, Paraguay, Peru, Philippines, Serbia, Tunisia , Turkey, Uruguay

Source: WTO – Regional Trade Agreements Information System (RTA-IS) database,

<http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx>

