Three Essays on Development

Analyzing Constraints to Development
Evaluating Development
Discussing Trade Patterns of Emerging Economies

submitted in partial fulfilment of the requirements for the
degree

Dr. rer. pol.

to the

Department IV

at the University Trier

submitted by

Diplom Volkswirt Julian Frede

Hummelsbergstraße 11, 50939 Köln

Supervisors:

Prof. Dr. Xenia Matschke, Ph.D. (University Trier)

Prof. Dr. Ludwig von Auer (University Trier)

Table of content

List of figures

List of tables

1. Introduction

Development and thereby change is probably one of the most persisting aspects of human existence. All humans and their social institutions strive for development in some sense. In this context, development economics focuses on developing countries, mainly on the economic aspects of their development by studying growth, inequality, poverty, and institutions (Ray, 2008). Within the wide range of topics in development economics, this dissertation covers three of the many important aspects of development.

The first essay discusses the basis on which development strategies are conceived and implemented for certain developing countries. After abandoning the Washington Consensus – a misguided, over-generalized approach which applied a one-size-fits-all framework for a country's development, development cooperation institutions based their strategies on more country-specific approaches. One of these approaches is Growth Diagnostics, developed by Hausmann, Velasco and Rodrik (2005). Following their approach, the first essay reveals and discusses development constraints identified for selected countries. The countries analyzed are West African countries which are members of the Economic Community of West African States (ECOWAS). This allows one to not only compare the constraints identified for the countries of the poorest region in the world, but it also enables one to analyze the awareness and institutional responsiveness of ECOWAS to its member-specific needs. The essay conducts a literature review to identify country-specific constraints to development and discusses the regional significance of the respective constraints. ECOWAS's policy is reviewed to check for awareness of the members' constraints and ECOWAS' institutional responses. The members' constraints are considered in relation to awareness and institutional responses of the regional community. This first meta-analysis for ECOWAS shows that this multinational institution is not only aware but also responds institutionally to almost every member constraint. While this essay draws considerable recommendations, e.g. on ECOWAS's general design, this result calls for further research on efficiency, sufficiency, and organizational structure of the regional institutional responses.

The second essay can be contextualized in the ongoing and long-lasting discussion of effects and impacts of development cooperation. This discussion is still heavily influenced by ideological positions. This is due to a "black box" problematic in development cooperation, which describes a lack of academically sound and understandable evaluations (Bourguignon, Sundberg, 2007). While evaluation is crucial for any fact-based discussion, approaches and

methods vary greatly. One major school in current evaluation research ignores the increasingly exhausted quantitative versus qualitative discussion and focuses the discussion on the basic program theory of change. This type of evaluation is defined as theory-based evaluation or program theory evaluation. It uses program theory, which describes how the program is supposed to achieve its intended results, and tests this theory empirically. Only on the basis of such a theory, is it possible to evaluate and plausibilize actual causal connections regarding identified changes (Weiss 1972; Rogers et al. 2000). In line with this theory-based evaluation, the second essay identifies Qualitative Comparative Analysis (QCA) as an effective, systematic and comprehensive instrument for testing program theory. The findings are based on a case study of a development cooperation program on electrification through renewable energy in Senegal. In an ex-post analysis, one simple and a more advanced program theory are tested to discuss QCA's potential. This exercise shows that falsification of program theories is straightforward. Moreover, QCA has substantial potential for the identification and advancement of program theory in line with the theory-based and realistic evaluation approach. QCA provides a structured, transparent, and iterative process which allows the step-wise advancement of program theory through participation of all relevant stakeholders. The results of the crisp-set QCA are robust when applying multi-value and fuzzy-set QCA. Moreover, they are robust compared to a regression analysis. In conclusion, this first time application of QCA to individual projects within one program in development cooperation shows that applying QCA can be recommended in a mixed method approach for evaluating development cooperation projects. It is seen to be very useful as a method for the evaluation step of identifying and testing program theory.

The third essay goes beyond the direct linkage to development cooperation and broadens the scope of this work to the role of emerging and thereby increasingly powerful economies, such as the BRICs, Indonesia or Turkey. The major research question of this essay is how emerging economies place themselves in the changing global balance of power and if emerging countries are turning away from developed countries – here for Turkey, the EU-example is most relevant. With this question in mind, the third essay analyzes the dynamics of Turkish export and import flows with regard to regional clusters (RCs) and bilateral trade costs (BTCs) by using a panel data gravity model. The roles of RCs and BTCs in two complementary phases are analyzed: in the first phase, it is their role in explaining the aggregated export and import patterns of Turkey by using unbalanced panel data for 180 countries over the period 1960-2012, compiled from the IMF's DOTS database. Next, these estimations are extended by also running the regressions for the data at four different time intervals, referring to four different economic and/or political

regimes of Turkey. In the second phase, the same exercise is repeated at the sectoral level for 176 countries over the period 1994 to 2010, using the BACI database. The main findings are that (i) the gravity model is very effective in explaining the export and import flows of Turkey; (ii) the EU27 has a high and statistically significant impact on Turkish trade; (iii) all close-by regions around Turkey have a high and significant impact on trade flows of Turkey; (iv) the EU customs union has a negative effect on Turkish exports and a positive effect on imports from the EU; (v) sectoral level analyses indicate that while some regions (e.g. Russia, EU27, North Africa, and Middle East) contribute positively to Turkish exports and imports, some other regions including North America contribute negatively. In conclusion and focusing on the actual research question, these results do not point to an abandonment of the West by the Turkish economy, but rather show that Turkey is positioning itself in a changing world with emerging regions to the North, East and South of Turkey.

In summary, the three essays comprising this dissertation provide three in-depth discussions and add to the literature and discussions on development constraints, evaluation, and trade development of emerging economies reflecting a potential political reorientation.

2. ECOWAS' capability and potential to overcome constraints to growth and poverty reduction of its member states

2.1. Constraints at a regional level

This paper focuses on the potential of regional communities to assist their member states in relaxing their country-specific constraints to development. As an example for a regional community, the Economic Community of West African States (ECOWAS) has been chosen.

In the process of analysis, the national constraints to growth are first identified for each ECOWAS member state, as defined in their national policy strategies. Today, these strategies and their respective policy recommendations emphasize country-specific constraints to growth and their relaxation. This rather new perspective is closely linked to the "Growth Diagnostics" approach of Hausmann, Velasco and Rodrik (2005) and the inclusive growth approach (Ianchovichina 2009). The latter presents a further development with a broader perspective on sustainable, long-term growth, while it still relies on the principles of the Growth Diagnostics approach. A country-specific analysis of development constraints typifies the basic structure of most national growth and poverty reduction strategies that identify the respective national constraints. Thus, Growth Diagnostics is a strategic approach "for figuring out […] policy priorities" (Hausmann, Velasco, Rodrik 2004, p.2). The methodology can be presented in form of a decision tree (see for an example Figure 2-4 in appendix 2.5.1). Following the logic of a decision tree, the question what keeps growth low is divided firstly into the constraints of inadequate returns to economic activities and high costs of finance. Going down the decision tree which provides further ramifications, growth diagnostics allows discussing which constraint is more severe for the economy and whose relaxation would bring the highest return. This qualitative assessment of an economy is based on different kinds of evidences reaching from macroeconomic modelling to qualitative expert interviews. Here, one of the major advantages of this approach for policymakers is that it enables one to include evidence into the discussion that is based on all existing development strategies. The different evidence is used in a qualitative discussion and decision on the relaxation of one or a selected number of

constraints to growth of an economy. As stated before, the same methodology has been applied in the Inclusive Growth approach, only the decision tree changed to include further dimensions.

The present analysis in this paper reveals 27 different national constraints that has been identified within the member states of the ECOWAS. Each one is present in more than one country. Following this, the constraints are discussed with regard to their constraining outreach, i.e. whether the constraints are purely national or also regional. In this process, it becomes clear that the regional community has to focus on all identified constraints. This paper discusses the institutional responses at the regional level to the member states' constraints. The analysis involves detecting the actual existence of regional institutions within ECOWAS and identifying their activities to provide evidence for tangible results. The research reveals that ECOWAS' institutions respond to almost all identified constraints. The paper concludes with a discussion of these institutional responses indicating regional weaknesses with regard to the constraints. The most significant weakness is the lack of responses to unsustainable population growth.

In conclusion, this meta-analysis shows that ECOWAS is not only aware but also responds institutionally to almost all member constraints. This result calls for further research on the efficiency, sufficiency, and amenability of the regional institutional responses.

This introductory chapter further presents the research context and motivation, followed by a short overview of ECOWAS' regional context. The second chapter presents an analysis of national constraints and a discussion regarding their regional relevance. In the third chapter, ECOWAS' awareness of constraints is identified and institutional responses by ECOWAS to the national constraints are analyzed. The fourth chapter concludes.

2.1.1. Constraints to development in a regional context

"Promoting convergence and, above all, growth in this region [ECOWAS] requires a deeper understanding of country-specific features and focus on the "most binding constraints" to growth, as outlined in the growth diagnostics approach." (Tirelli 2010, 4)

The United Nations analysis, cited above, highlights the problems but also the need to assess development potential at the regional level. As has been shown, the trend of development analysis is to identify country-specific constraints. Considering these constraints is an essential part of any

regional development policy. But does regional policy consider national constraints? The motivation behind this research is to find an answer to this question.

Using the example of ECOWAS, the question narrows down to (i) if and where ECOWAS responds to its members' constraints, and (ii) how ECOWAS can improve its regional policy to properly target regional challenges.

This paper will not question the countries' development strategies and the development strategies' compilation processes, but the constraints found in these documents are taken as the country- and time-specific constraints to development. Nevertheless, limitations clearly exist, for in reality national or regional development strategies do not explicitly follow one single systematic approach such as growth diagnostics.

2.1.2. ECOWAS and its context of activities

The Economic Community of West African States (ECOWAS) was founded in 1975. The fifteen member states are: Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo. Figure 2-1 provides a map of the ECOWAS region. Its vision statement adopted in 1975 is still in place (with small changes) and this work fits well to this general policy objective, discussing ECOWAS's awareness of national development constraints.

"To create a borderless, peaceful, prosperous and cohesive region built on good governance and where people have the capacity to access and harness its enormous resources through the creation of opportunities for sustainable development and environmental preservation."

Vision statement of the ECOWAS (ECOWAS 2010)

ECOWAS has two main missions: first, the ECOWAS institutions provide a "forum and framework for sustainable economic development and poverty reduction" (ECOWAS 2010b). Second, the institutions seek to promote regional peace and political stability (ECOWAS 2010b). The idea behind this wording clearly shows that regional integration is seen as one of the most appropriate ways to initiate development.
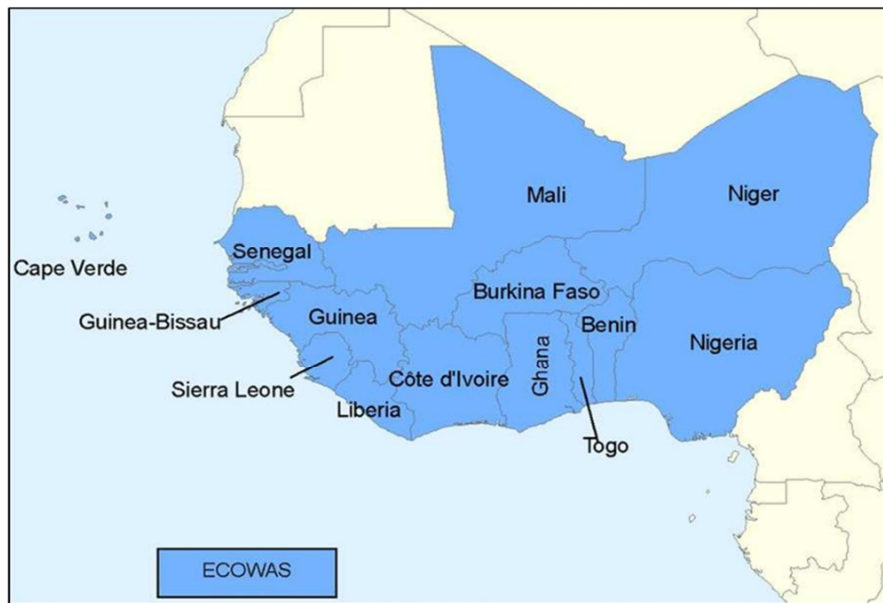
Figure 2-1: ECOWAS' countries (Eurostat 2009).

Therefore, ECOWAS defines its mission as relaxing regional constraints to development. In the early days of the community, this meant purely economic development; today, with a broader approach to development, this includes the ideas of human and green development. One indication in this regard is the official change of ECOWAS' perspective from an "ECOWAS of States" to an "ECOWAS of People" as stated in the ECOWAS Vision 2020 (ECOWAS 2010).

ECOWAS operates politically and economically in one of the most difficult regions worldwide. It is characterized by harsh poverty which can be found region-wide. Furthermore, political instability and even frequent open military conflicts are widespread. Therefore, this subsection will take a brief look at the issue of poverty followed by a description of political stability.
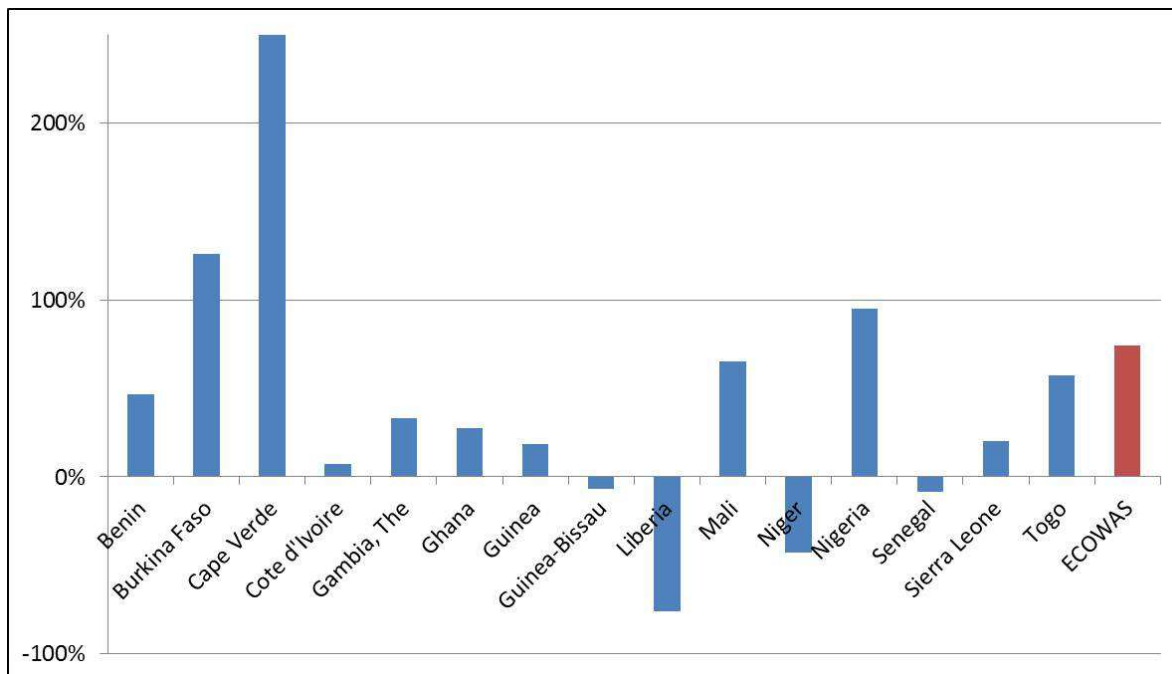
Figure 2-2: ECOWAS' countries GDP/capita change from 1986 to 2010 (World Bank 2012g).

From 1986-2010, ECOWAS countries experienced an increase in GDP per capita (constant 2000 US$) of 41%. This is equal to an average annual growth rate of 1%.[1] At first glance, this is a success story. However, there are two aspects in this positive performance which point to a different picture.

First, wealth is unequally distributed between the ECOWAS countries (not to mention inequality within the countries). Figure 2-2 demonstrates that on the one hand, Cape Verde almost doubled its GDP per capita and countries such as Ghana and Nigeria grew by 75%. On the other hand, Liberia experienced a decrease of more than 72% in GDP per capita, followed by Cote d'Ivoire (-20%) and Niger (-12%). The growth in Nigeria, which affects about half of ECOWAS's population, is the major cause of an overall positive regional performance.

---

[1] Before 1986, data for ECOWAS in total is not available (WorldBank 2012g).

Second, the comparison of ECOWAS's growth performance with other regions reveals a widening gap with ECOWAS at the low end of per capita income and growth performance. Figure 2-3 illustrates this gap. In 1960, ECOWAS started with only 62% of the Sub-Saharan income level, the poorest region worldwide. ECOWAS reached a relative income level of almost 30% of the East Asian region and well below 10% of the European and Central Asian income per capita. Thus, even the starting point was difficult. Until 2010, the gap to all groups had widened. Now, ECOWAS has reached only 42% of the Sub-Saharan per capita level. This disparity is negligible and almost invisible in the graph as the difference to other regions has been even larger and has increased further. Thus, despite some success in selected countries, in total, ECOWAS countries have experienced only a very limited growth and increase of GDP per capita.
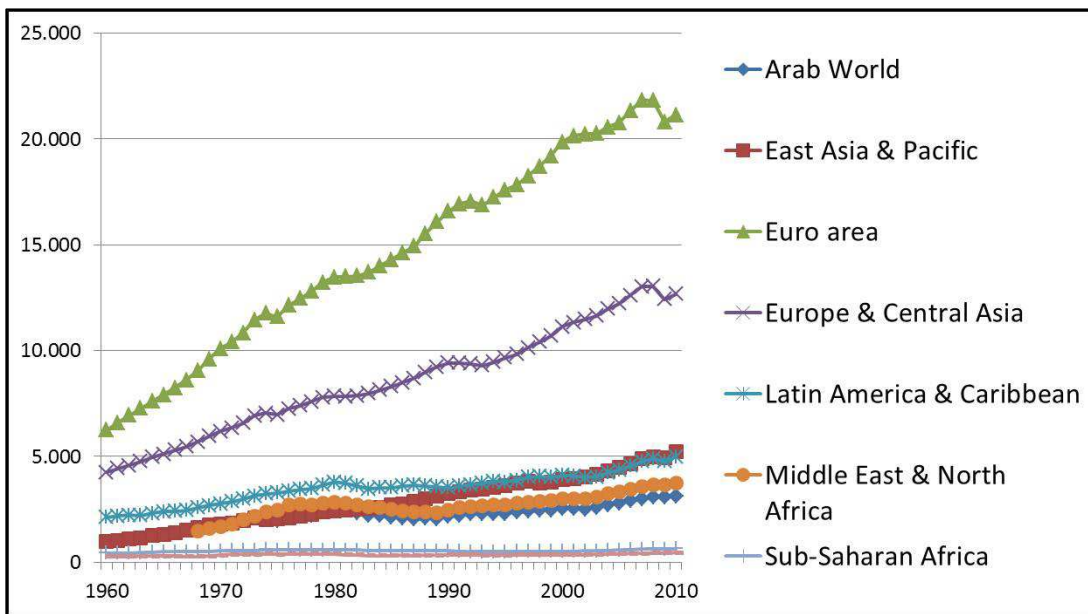
Figure 2-3: GDP per capita in constant 2000 US-Dollars from 1960 to 2010 (World Bank 2012g).

Political instability also has to be mentioned as a key factor in ECOWAS' development. There has been and there still currently is war and civil war in the region strongly affecting previous development efforts, e.g. in Mali. From 1960 to 2008, out of fifteen member countries only two were not involved in war or civil war (Edi 2007). It comes as no surprise that in this paper, political instability has been identified as a major constraint to development in two thirds of the countries.

2.2. Common patterns in national constraints

The meta-analysis of constraints in the ECOWAS member countries reveals 27 national constraints to development. This manageable number results from the fact that some major constraints, for example poor governance or political instability, restrain more than half of the countries. Another important reason for the relatively low number of constraints is the actual composition of a constraint. One example is the poor governance constraint that accumulates constraints related to government activities such as corruption or inadequate property rights. Therefore, the manageable number of constraints results partly from accepted limits in differentiation. Nevertheless, the composition of constraints reflects how constraints are presented in the analyzed documents.

2.2.1. Identifying national constraints to development

Identifying national constraints has been a challenging task for a literature review. This paper focuses on constraints to growth and poverty reduction, thus, on constraints to development in general. This is necessary because most policy papers do not conduct a systematic growth or inclusive growth analysis.[2] The literature review consists of the major growth and development strategies of national governments and of additional documents by two major donor organizations, the World Bank and the International Monetary Fund (IMF). This selection was necessary due to comparability of the level of analysis – in every country there is the possibility to find each constraint identified in some sub-level policy paper.[3]

Despite the predominance of government analysis, it has to be emphasized that almost none of the documents is entirely written and funded by the government itself. Most funding comes from donor institutions such as the IMF and the World Bank, but also from other donors such as UNDP or the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). Throughout this analysis, the issue of donor influence on the analyzed documents has to be kept in mind – especially since the poor governance constraint, thus, low institutional implementation capacity, is identified as a constraint in fourteen of fifteen countries.

---

[2] The appendix lists in table 2-4 the major documents by country.

[3] In a previous version of this paper, the literature review was extended to all analysis written for the national level which led to the following shares of documents: government documents (53%), documents of the Bretton Woods institutions (27%), complementary literature (20%, mainly donor driven, e.g. by the African Development Bank (AfDB) or the United Nations Development Programme (UNDP)). The small number of growth diagnostics (4) and two more related documents has been problematic. In a peer review process for a conference (PEGNET conference 2012) the amendment to reduce the literature review to government, IMF, and World Bank documents for better comparability has been emphasized by academics and practitioners.

A theory-based starting point for a framework of constraints has been described in the Growth Diagnostic and the Inclusive Growth Diagnostic approaches (Hausmann 2005). The analysis of this paper is based on these theoretical approaches, but the list of constraints has been completely adaptable based on findings in the literature.

Table 2-1: List of constraints (by group and sub-group) and frequency of occurrence.

Group and sub-group	Constraints	Frequency (%)
Government		
	Barriers and costs of doing business	73%
	Coordination failure	87%
	High taxation	27%
Government failures	Inadequate statistics	7%
	Labor market rigidities	13%
	Poor governance + corruption	80%
	Unsustainable government finance	40%
Human capital	Poor education or educations system	60%
	Poor health or health system	40%
	Communication technologies	33%
	Energy	93%
Inadequate infrastructure	Sanitation and drinking water	60%
	Transport – air	67%
	Transport – land	80%
	Transport - water	73%
Overall environment for development		
Culture	Cultural constraints	20%
Environmental risks	Environmental risks	47%
	Unsustainable natural resource exploitation	40%
Population growth	Population growth	27%
Stability (political stability, peace, inner security)	Political instability	53%
	Poor institutions	20%
Private sector and investments		
Diversification	Diversification (focus on export structure)	67%
	Financing (high cost of finance)	13%
Investment and financing	Low quantity of investment	47%
	Poor quality of investment	40%
Market failures	Lack of self discovery (innovation)	33%
	Low demand (due to small domestic market)	13%

2.2.2. Listing constraints to ECOWAS countries

Altogether, 27 constraints have been identified for the fifteen ECOWAS countries.[4] Table 2-1 shows these constraints. For a better overview, the constraints are divided into three groups: 1. private sector and investments, 2. government, and 3. overall environment for development.

Sub-groups are introduced to further arrange the constraints: for example, within the government context, there are 16 constraints which are linked to special government failures, human capital, and infrastructure. Most of the constraints can be found in the context of *(1) government activities*. In particular, the categorization in the sub-group of government failures has been challenging. To allow for a manageable and comprehensive overview of the constraints, the majority of governance problems are accumulated in the constraint poor governance and corruption - a typical way of presenting governance issues in the analyzed documents. All governance related problems have in common inadequate behavior or poor performance of government institutions. This constraint includes, amongst other factors, corruption, transparency, rule of law, and property rights issues. The constraints 2 to 6 are constraints explicitly identified and discussed on their own in a large number of states. With regard to labor market rigidities, it has to be highlighted that this constraint is characterized by unskilled human capital, i.e., the lack of sufficiently well-educated human capital.[5] The last constraint in this sub-group, coordination failure, is generally linked to governments but could also be placed in a market failure context. As activities to overcome coordination problems are generally institutionalized within the government or at least initiated by the government, they are most likely linked to the former. Besides government failures, there is a more general discussion with regard to education and health issues, especially their constraining impacts on human development. Both are combined under the name human capital, as they are also mostly treated separately in the analyzed documents. The next sub-group is infrastructure which consists of six constraints: three transport related constraints (air, water, land), two constraints focusing on basic supply of energy and water (and sanitation), and one integrating challenges with regard to communication technologies (telephone, mobile phone, and internet). The energy constraint includes not only electricity but also general energy issues such as the supply of gas or constraining energy-related regulations.

---

[4] Table 2-5 in the appendix shows which constraints have been identified for which countries.
[5] Only in Cape Verde is the labor market inflexibility due to unskilled and unproductive labor compounded by high labor costs due to labor market regulations (Government of the Republic of Cape Verde 2008, 48, 84).

The second group of constraints is the *(2) overall environment for development*, which has four sub-groups. Firstly, in some countries political instability constitutes a major constraint to development. But in post-conflict countries, the problematic rebuilding of institutions is clearly linked to instability. Next, environmental risks can be split into unsustainable resource exploitation and general environmental risks. The latter could be desertification or flooding which are often viewed in conjunction with climate change. In this context, population growth has also been identified as a severe constraint, leading to an overuse of ecological capacities. Moreover, population growth presents social challenges to the health and education system. Finally, some recent studies identify culture as a constraint to development, arguing that certain traditions and behavior hold back development.[6]

The third group of constraints, *(3) private sector and investment*, has three sub-groups. In investment and financing, constraints with regard to the quantity and quality of investment are assessed. The former describes the general amount and the relation of private to public finances, whereas the latter focuses on judging sustainability of investments and financing costs for firms. Market failures include a lack of self-discovery and low demand. A lack of self-discovery is synonymous with lack of entrepreneurial activity. Self-discovery covers not only innovation problems in the private sector – which are generally linked to poor capacity, a lack of innovative clusters, and human capital – but also includes problems of scaling up innovative production, as is the case in Ghana. Low demand is related to a small domestic market. The constraint of low diversification is clearly linked to this problem. This constraint highlights not only the external risks due to high dependency on a few main export goods (mostly commodities), but also the internal risks due to a highly concentrated economy.

2.2.3. Patterns of national constraints in the region

The West African region is one of the poorest and least developed regions in the world, constrained by external and internal development challenges. With regard to the overall environment for development, external environmental risks endanger all development effort. Nevertheless, even the overall environment is clearly negatively affected by internal problems, for example instability or unsustainable population growth. This intuitive emphasis on internal problems is intensified when accounting for the numerous internal development constraints. With regard to these constraints,

---

[6] In Gambia, for example, male-biased inheritance, kinship obligations, fatalism, or a backward bending tendency to compromise is mentioned (Government of the Republic of The Gambia 2011).

West Africa's national institutions (government and private sector) barely have the capacity to build and maintain a functioning state or market system. Thus despite severe external challenges ECOWAS member countries have a long list of major constraints to their development whose relaxation can be initiated by internal processes. On a related note, it has to be emphasized that constraints to growth are generally all interconnected – as are all activities in a state and economy.[7] Thus, it comes by no surprise that each of the listed constraints has been explicitly identified in more than one nation. Nevertheless, there are significant differences in their frequency. Besides displaying the structure of the constraints, Table 2-1 has a third column indicating the frequency of occurrence for each constraint, measured as percentage of countries for which a certain constraint was reported.[8]

There are four constraints that almost every country identifies as constraining (12 to 14 of 15 countries, or 80%-93%). First, there is *inadequate energy supply* which is directly or indirectly linked to infrastructure – for example directly by necessary grid-extension in Benin or indirectly by high electricity prices due to low quality installation in Senegal. In addition to this energy constraint, a lack of *transport infrastructure* holds back the entire region. And poor infrastructure is often connected to poor management. The equally ranked constraint *poor governance and corruption* confirms equally the regional significance of poor institutional management which itself is part of poor governance. Beyond poor governance, *coordination failures* are an even more relevant constraint which is linked to management capacities. This reveals a lack of institutional capacity to coordinate activities. This is exemplarily visible for the agricultural sector in Mali, the oil sector in Ghana or the transport sector in Burkina Faso, but also the organization of basic public services, such as a health care system – indeed poor management of the health system severely constrains six ECOWAS member states.

There are seven additional constraints identified in at least half of the countries (8-11 countries, or 53%-73%). Taken together with the top four constraints, these constraints underline the importance of infrastructure and, in general, government activities related to the relaxation of constraints. Only two constraints do not fall into the government category. First, there is a *lack of economic diversification* which is a typical structural problem in developing countries. Second, there are *environmental risks* which include both internal factors and climate change. With regard to the

---

[7] For further discussions on this issue, see the modelling of distortions in Hausmann (2005).
[8] For a more detailed overview of the frequency of occurrence, the appendix presents a graphical overview in Figure 2-5 and a table (Table 2-6) showing constraints ordered by frequency.

current drought and famine in the Sahel, this constraint is probably underestimated in its importance. For example, Togo and Senegal do not identify this as a constraint despite depending heavily on agriculture and, thus, on increasingly irregular rain falls (Diop 2012).To sum up, in at least 50% of the countries, nine out of eleven of the identified constraints are related to government activities. This is a strong indication of the need and potential to internally overcome the most challenging problems.

At least one country identifies the remaining nationally identified constraints in their policy documents, but one constraint remains unmentioned: *inadequate statistics*. But all constraints, even this constraint with the lowest frequency, clearly have regionally relevant impact. An analysis of the constraints reveals that data availability is definitely an issue in all analyzed countries. However, instable conflict countries or post-conflict countries do not generally identify this as constraint. For them, there are more urgent problems. None of the constraints identified in the literature have been found in only one country. Thus, all constraints appear to be regional issues. Therefore, it is not only difficult but even misleading to define a threshold for the number of countries necessary in order to categorize the constraint as regional, sub-regional or purely national.

There are other reasons to analyze all constraints further. First, it is highly questionable whether a national analysis can be fully comprehensive in assessing development constraints. All country-specific strategy documents showed the same tendencies, but each document led to an amendment of the here presented list of constraints. Second, in the process of identifying constraints, some may even have been left out due to the overlap of a related constraint. For example, low demand due to a small domestic market is only sometimes identified as a constraint, yet sometimes it is left unmentioned – in an effort to explain why this is so, one can speculate that the existence of this constraint is so obvious that it is considered unnecessary to explicitly mention it. Another explanation could be that this constraint is defined as part of the difficulties associated with diversification or coordination problems. Third, the underlying time perspective (short-, medium-, long-term) is another issue which has not been clearly defined in each document and which can lead to the inclusion or exclusion of certain constraints. For example, a country facing a conflict or that recently experienced a conflict will not identify constraints such as a small domestic market or cultural constraints to development. Fourth, there is a limited amount of documents per country discussing constraints. Therefore, it is difficult to rule out the possibility that some constraints have been overlooked. Fifth, there are limitations to the literature review provided by this paper. Despite

the effort put into the analysis and research of documents, some constraints might have escaped the alert eye.

This discussion could be extended until constraints that were not even identified have been included in the analysis. However, this paper will focus on constraints of which the national governments and the two major institutions writing or assisting with the national strategies mostly defined as Poverty Reduction Strategy Papers (PRSPs) are at least aware. This discussion intends to show that an analysis which only focuses on frequency and which rules out some constraints by means of an arbitrary threshold would run the risk of excluding some regionally important constraints. Therefore, the next chapter will discuss all 27 constraints with regard to ECOWAS' awareness and institutional responses.

2.3. ECOWAS' awareness of constraints and its institutional responses

2.3.1. ECOWAS' awareness of national constraints

In the last decade, the most comprehensive work on constraints to growth and poverty reduction focusing on ECOWAS has been done by the Regional Poverty Reduction Strategy Paper (RPRSP) of ECOWAS and the West African Economic and Monetary Union (WAEMU) (ECOWAS 2006).[9] In this document, ECOWAS emphasizes the problem that fragmented approaches are not sufficient to overcome the numerous constraints which are transnational. Thus, ECOWAS identifies regionally important constraints to development.

The RPRSP constraints from 2006 are mostly similar to the regionally identified constraints by more recent documents, e.g. by the ECOWAS Regional Strategic Plan (2011-2015) (ECOWAS 2010b), its Vision 2020 (ECOWAS 2010) or the EBID Strategic Plan 2010-2014 (EBID 2009). The majority of the recent national constraints, described in the preceding chapter, are identified in the ECOWAS documents.[10] There are only four nationally identified constraints which are not mentioned in the regional documents. There is no noticeable pattern within the unidentified constraints. Table 2-2 provides an overview.

Table 2-2: Recent regional constraints not identified by ECOWAS.

Main context	Constraints	
Government	Government failure	Inadequate statistics
Overall environment for development	Culture	Culture
Overall environment for development	Environmental risks	Unsustainable natural resource exploitation
Private Sector and Investment	Investment and financing	Poor quality of investment

---

[9] The WAEMU is another regional community which cooperates with ECOWAS and consists of the following French speaking countries: Benin, Burkina Faso, Cote d'Ivoire, Mali, Niger, Senegal, Togo and Guinea Bissau. For more information, see Lavergne (1997).

[10] Table 2-7 in the appendix shows all constraints identified by ECOWAS which are also compared with the categories and constraints discussed in the preceding chapter. In addition, in appendix 2.5.2, all 27 constraints are discussed in detail.

For two of the constraints, *inadequate statistics* and *culture*, the reason for their absence could be a lack of awareness in the region concerning these constraints. This argument gains strength if one considers the frequency of these constraints in the national documents (1 and 3 times respectively). This is very low compared to other constraints. Moreover, both constraints have a high potential for being overlooked, as has been previously discussed. The constraints *unsustainable natural resource exploitation* and *poor quality of investment* are included implicitly. For the former, the focus on environmental risks could be extended up to these related constraints. As concerns the latter, the discussion on investment quantity should involve qualitative aspects. Nevertheless, it has to be noted that none of the four are explicitly identified; thus, the awareness is minor at the regional level compared to the country level.

2.3.2. Institutional responses to constraints

This section discusses the institutional responses of ECOWAS to the previously identified national constraints. Special attention is paid to the institutions which have the potential to relax the four unmentioned constraints, which in turn indicate implicit policy awareness. On the whole, it can be said that for most nationally identified constraints, institutions exist in ECOWAS that implement activities to relax these constraints to development: for 18 out of the 27 constraints, the ECOWAS institutions provide tangible results. Tangible activities of these institutions can be for example a conference as a facilitating activity of a policy strategy. They can also be identified by analyzing actual financial accounts, thus, actual expenses with regard to the relaxation of a certain constraint. If such activities can be identified, the institutional response is further described as yielding tangible or at least limited tangible results. Six constraints were shown to receive institutional responses but tangible results were only limited. For only three constraints, no or very limited institutional responses could be identified. Table 2-3 displays the constraints that were not explicitly identified by ECOWAS and the constraints that did not receive institutional responses by any ECOWAS institution. In addition, Table 2-8 in the appendix displays all constraints with the last column indicating if institutional responses to these constraints can or cannot be identified (with tangible or limited tangible results).

The analysis for each constraint focuses on the mere existence of institutions which target the relaxation of the selected constraint. Each institutional response has been analyzed with regard to its actual existence and if it provides tangible results – thus activities beyond being created or

mentioned in a policy paper. This section discusses exemplarily the most prominent constraints, as well as the ones without awareness or without institutional responses.

Table 2-3: Institutional responses to regionally unidentified constraints.

Constraints	Identified by ECOWAS	Institutional response
Inadequate statistics	0	Existent (tangible results)
Culture	0	Non-existent
Unsustainable natural resource exploitation	0	Existent (tangible results)
Population growth	1	Non-existent
Poor quality of investment	0	Non-existent

Inadequate statistics: ECOWAS has identified low quality of data as a regional constraint. Its institutional response is named ECOSTAT. This institution provides statistics and data on its webpage which can be classified as a tangible result. Furthermore, ECOSTAT is involved in a program to develop statistical systems in West Africa and it supports national statistical offices (ECOSTAT 2004). In addition to ECOSTAT, the Commission of Macro-Economic Policy hosts the Research and Statistics Directorate, whose research pillar is responsible for the "technical expertise in economic policy coordination, analysis and research" (ECOWAS 2012c). Thus, the ECOWAS internal statistics are also covered.

Culture: Identifying activities targeting the cultural constraint is problematic as it does not relate to the typical cultural activities of ECOWAS. ECOWAS typically focuses on promoting cultural activities or exporting traditional goods, but the constraint "culture" is more related to habits and traditions which hold back development in the region. An example of ECOWAS's responses to this issue can be seen in the activities of the ECOWAS Gender Development Center (EGDC) (Dibba 2010). It must be noted that it is quite a radical statement to identify culture as a constraint. However, it has been identified as a constraint. ECOWAS is currently only active with regard to the gender problematic, thus, it provides only very limited institutional responses.

Unsustainable natural resource exploitation: In a Supplementary Act, the ECOWAS Heads of State and Government decided that the ECOWAS Environmental Policy will be "part of the ECOWAS vision" (Article 4) and the ECOWAS treaty (ECOWAS 2008c, Article 20, 2.). Within this policy, four strategic lines for action include the "promotion of sustainable management of

resources for the improvement of an environment-friendly sub-regional economy." (ECOWAS 2008d, 19). Examples of tangible results resulting from this detailed and ambitious strategy are: the African Monitoring of the Environment for Sustainable Development (AMESD) 2008-2013, which is implemented in cooperation with the European Development Fund to create information management capacity and earth observation technologies, and the ECOWAS Forest Policy, which has been adopted by the member states in 2010 (ECOWAS 2011b).

Poor quality of investment: Implicitly this constraint has been identified in ECOWAS documents on the common investment market. ECOWAS documents point out that FDI is sufficiently high in the oil sector but very low in other sectors (ECOWAS 2012). Furthermore, most programs such as the ECOWAS framework for Export Promotion & Enterprise Competitiveness for Trade (ExPECT), which are designed to promote value chain efficiency in selected sectors, implicitly target increasing investments in these sectors which result from higher profitability. Nevertheless, despite the general activities to increase FDI, a clear strategy channeling investment to different sectors could not be identified. Thus, there are only very limited implicit institutional responses.

Population growth is clearly identified in recent ECOWAS documents. However, there is no direct institutional response. It could be argued that health and gender related programs are indirectly linked to population growth. Furthermore, economic growth and more efficient production tackle a related issue with respect to population growth: scarcity of resources. Nevertheless, there are no strategy documents mentioning these argumentations. Thus, ECOWAS seems to lack institutional responses with regard to population pressures.

In conclusion, the constraints *inadequate statistics* and *unsustainable natural resource exploitation* receive institutional responses, despite not being identified in the regional analysis and reports. The remaining constraints are partly identified but none of them triggers institutional responses within the ECOWAS organizations.

2.4. Conclusion: regional responses to members' constraints

ECOWAS addresses national constraints in its structure, and, furthermore, it provides tangible results with regard to the relaxation of constraints. Regional institutional responses are not traceable for only three constraints: *population growth*, *culture* and *poor quality of investment*. In these cases, the institutional responses reveal a necessity for improving ECOWAS's activities. This is a very positive, even surprising result with regard to the ECOWAS structure.

Several further issues need to be addressed in this context: First, the analysis focuses on the actual existence of ECOWAS institutions and institutional activities with regard to the constraints. Neither has there been an analysis of the effectiveness of the activities nor has their sufficiency been assessed. What does this mean? With regard to the poor development performance of the ECOWAS member states, one can justifiably question the effectiveness and sufficiency of their responses. Each constraint would have to be analyzed intensively to allow for a reasonable discussion of efficiency and sufficiency. This is one tempting possibility for further research.

Second, the actual presentation of ECOWAS in this literature review and its web appearance did not allow for an easy analysis of its institutional responses, activities, and results. For example, information provided by the commission and other institutions was mostly outdated and links to "new" information often led to a dead-end. This leads to two further points of discussion: the nonexistence of a clear, comprehensive presentation of the ECOWAS institutions and the problem of donor dependency. The former can be summarized in the phrase "informational rag rug": one of the results of this paper is to reveal the urgency for ECOWAS institutions to provide an accessible picture of the community. The latter has been identified through the analysis of the institutional response and the strong involvement of donors in almost all activities. Clearly, this plays an important role in creating this almost chaotic ECOWAS structure. It should be part of a donor's motivation to develop a regional community endowed with an accessible structure.

Third, the national strategies by IMF and World Bank should be adapted with regard to design and procedural method(s), preserving the country-specific focus of each development strategy, but also allowing for an easier transnational assessment and comparison.

It is a limitation of this paper that it remains problematic to sum up constraints for different countries. The range within constraints, e.g. education, can reach from the rebuilding of the entire

education system in post-conflict states such as Guinea-Bissau to an improvement of education for the tertiary sector in Cape Verde. Despite the analytical limitations, this research presents the surprising result that ECOWAS provides institutions and certain activities well connected to regionally and nationally identified development constraints. But it is apparent that research and policy activities should now change their focus from simply creating institutional responses to single constraints to interlinking these solutions and implementing them in an effective manner. This includes involving major partners in a structured, transparent process of ECOWAS activities. The fact is: institutions do exist; but the question of how they can be best put to use remains open.

2.5. Appendix to essay 1

2.5.1. Further tables and figures

Figure 2-4: Example of a decision tree for the Growth Diagnostics
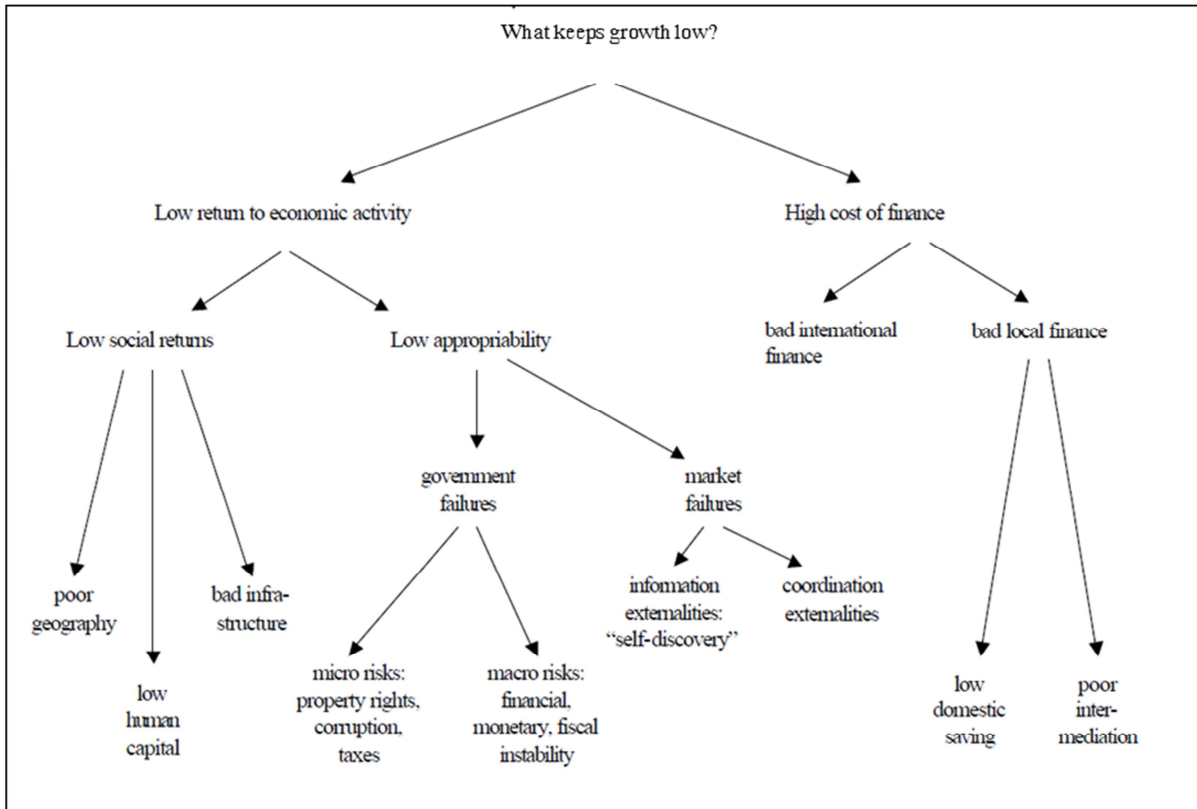
Note: This example is the basic version of a decision tree, suggested by Hausmann, Velasco and Rodrik (2005, p.27).

Table 2-4: Selected literature for identifying national constraints.

Country name	Document	Institution
Benin	Government of the Republic of Benin. 2011. "Growth and Poverty Reduction Strategy (GPRS) - 2011-2015."	Government
	World Bank, ed. 2009. Benin - Constraints to growth and potential for diversification and innovation : country economic memorandum. Report No. 48233-BJ.	Bretton Woods
Burkina Faso	World Bank. 2009. "Country Assistance Strategy for Burkina Faso for the Period FY 10-12." Report No. 49588-BF. International Development Association, International Finance Corporation; Multilateral Investment Guarantee Agency. http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2009/08/13/0003349 55_20090813031525/Rendered/PDF/495880CAS0P111101Official0Use0Only1.pdf.	Bretton Woods
	Ministère de l'Economie et des Finances de Burkina Faso. 2010. "Stratégie de croissance accélérée et de développement durable (SCADD) 2011-2015." http://www.scadd2012.com/m-17-partenaires.html.	Government
Cape Verde	Government of the Republic of Cape Verde. 2011. "Programa do Governo. VIII Legislatura 2011-2016." www.governo.cv.	Government
	Government of the Republic of Cape Verde. 2008. "Growth and Poverty Reduction Strategy Paper - II. 2008–11." http://www-wds.worldbank.org.	Government
Cote d'Ivoire	World Bank. 2010. "Country Partnership Strategy for the Republic of Côte d'Ivoire for the Period FY10-FY13. Report No. 53666-CI." International Development Association (Francophone Africa Country Cluster 2, AFCF2, Africa Region); International Finance Corporation (Sub-Saharan Africa Department); Multilateral Investment Guarantee Agency (Sub-Saharan Africa Department)	Bretton Woods
	Government of the Republic of Côte d'Ivoire. 2012. "Le Plan National de Développement (PND) 2012-2015."	Government
Gambia	Republic of The Gambia. 2011. "Programme for Accelerated Growth and Employment (PAGE) 2012 -2015." Ministry of Finance and Economic Affairs.	Government
	World Bank. 2008. "Joint Assistance Strategy for the Republic of The Gambia." Report No. 42267-GM. International Development Association; African Development Bank. http://go.worldbank.org/SY3H1ONL10. AND World Bank. 2010. "Joint Assistance Strategy Progress Report for the Republic of The Gambia." Report No: 55219-GM. International Development Association; African Development Bank. http://documents.worldbank.org/curated/en/2010/06/12525563/gambia-joint-assistance-strategy-progress-report.	Bretton Woods
Ghana	Government of the Republic of Ghana. 2010. "Medium-Term National Development Policy Framework: Ghana Shared Growth And Development Agenda (GSGDA), 2010-2013. Volume I: Policy Framework." National Development Planning Commission (NDPC). http://www.ndpc.gov.gh/.	Government
Guinea	Government of the Republic of Guinea. 2011. "Document de Stratégie de Réduction de la Pauvreté. DSRP (2011-2012)." Ministère de l'Economie et des Finances. http://www.srp-guinee.org/download/dsrp-2011-12/DSRP_2011-2012.pdf.	Government
Guinea-Bissau	Republic of Guinea-Bissau. 2011. "Second National Poverty Reduction Strategy Paper DENARP/PRSP II (2011–2015)." Ministry of Economy, Planning, and Regional Integration. http://www.imf.org/external/pubs/ft/scr/2011/cr11353.pdf.	Government
Liberia	Werker, Eric and Jasmina Beganovic. 2011. Liberia: A Case Study. International Growth Center Workshop on Growth in Fragile States.; African Development Bank and African Development Fund. 2008. Liberia. African Development Bank – World Bank Joint Assistance Strategy 2008-2011 And Eligibility To The Fragile States Facility. http://www.afdb.org.	Bretton Woods

	Government of Liberia. 2008. Poverty Reduction Strategy. http://www.mopea.gov.lr/.	Government
Mali	Government of the Republic of Mali. 2011. "CSCRP : Cadre Stratégique pour la Croissance et la Réduction de la Pauvreté (2012-2017)." http://www.mali-apd.org/spip.php?article6.	Government
Niger	Government of the Republic of Niger. 2007. ""Combating Poverty, a Challenge for All" Accelerated Development and Poverty Reduction Strategy 2008 - 2012." Poverty Reduction Strategy, Second Generation. Prime Minister's Office Prs Permanent Secretariat. http://www.imf.org/external/pubs/ft/scr/2008/cr08149.pdf.	Government
Nigeria	Government of Nigeria. 2009. "Nigeria Vision 20: 2020; Economic Transformation Blueprint." National Planning Commission.	Government
	World Bank. 2010. "Performance Assessment Review - World Bank Economic Reports on Growth Diagnostics in four African Countries: Ghana, Mauritius, Nigeria, and Uganda. Report No.: 55404." Country Evaluation and Regional Relations (IEGCR); Independent Evaluation Group (IEG).	Bretton Woods
	World Bank. 2007. "Nigeria Competitiveness and Growth Poverty Reduction and Economic Management 3 Country Department 12 Africa Region UK DFID. Country Economic Memorandum: Main Report." Report No. 36483-NG II/III.	Bretton Woods
Senegal	Ministère de l'Economie et des Finances (MEF) de la République du Sénégal. 2011. "Un peuple - un but - une foi - Document de Politique Economique et Sociale (DPES) 2011-2015. Placer le Sénégal sur la rampe de l'émergence." Unité de Coordination et de Suivi de la Politique Economique (UCSPE).	Government
	Ministère de l'Economie et des Finances (MEF) de la République du Sénégal. 2008. "Analyse des contraintes à la croissance économique et au développement du secteur privé. Rapport final." Mission de Formulation et Gestion du MCA Sénégal.	Government
Sierra Leone	Government of Sierra Leone. "An Agenda for Change. Second Poverty Reduction Strategy (PRSP II) 2008-2012."	Government
Togo	International Monetary Fund. 2011. "Togo: Poverty Reduction Strategy Paper—Progress Report—Joint Staff Advisory Note." IMF Country Report No. 11/6. http://www.imf.org/external/pubs/ft/scr/2011/cr1106.pdf AND Togolese Republic. 2009. "Full Poverty Reduction Strategy Paper 2009-2011. Final Version." http://www.imf.org/external/pubs/ft/scr/2010/cr1033.pdf.	Bretton Woods

Table 2-5: Constraints by type (group, subgroup).

Country name			BEN	BFA	CPV	CIV	GMB	GHA	GIN	GNB	LBR	MLI	NER	NGA	SEN	SLE	TGO	Total	%
Document																			
Main context	**Sub-level**	**Constraints**																	
Government	**Inadequate infra-structure**	*Energy*	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	**14**	**93%**
Government	**Inadequate infra-structure**	*Transport - air*	1	1	0	1	0	0	0	1	1	1	0	1	1	1	1	**10**	**67%**
Government	**Inadequate infra-structure**	*Transport - land*	1	1	0	1	1	1	1	1	1	0	1	1	1	1	0	**12**	**80%**
Government	**Inadequate infra-structure**	*Transport - water*	1	1	1	1	0	0	1	1	1	0	0	1	1	1	1	**11**	**73%**
Government	**Inadequate infra-structure**	*Sanitation and drinking water*	0	0	1	1	0	1	1	1	1	1	1	0	1	0	0	**9**	**60%**
Government	**Inadequate infra-structure**	*Communication technolo-gies*	0	0	1	1	0	0	1	0	0	1	1	0	0	0	0	**5**	**33%**
Government	**Human capital**	*Poor education or educa-tions system*	1	0	1	0	1	0	1	1	1	1	1	1	0	0	0	**9**	**60%**
Government	**Human capital**	*Poor health or health system*	0	0	1	0	1	0	1	1	1	0	1	0	0	0	0	**6**	**40%**
Private Sector and Investment	**Investment and financing**	*Low quantity of invest-ment*	1	1	0	1	0	1	0	1	0	0	0	0	1	1	0	**7**	**47%**
Private Sector and Investment	**Investment and financing**	*Poor quality of investment*	0	1	0	1	1	0	0	0	0	0	1	1	1	0	0	**6**	**40%**
Private Sector and Investment	**Investment and financing**	*Financing (high cost of finance)*	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	**2**	**13%**
Private Sector and Investment	**Market failures**	*Lack of self discovery (innovation)*	1	1	0	0	1	0	0	1	0	0	0	1	0	0	0	**5**	**33%**
Private Sector and Investment	**Market failures**	*Low demand (due to domestic market)*	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	**2**	**13%**
Government	**Government failure**	*Labor market rigidities*	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	**2**	**13%**
Government	**Government failure**	*High taxation*	1	0	1	0	1	0	0	0	0	0	1	0	0	0	0	**4**	**27%**
Government	**Government failure**	*Poor governance + corruption*	1	0	1	1	1	1	1	1	1	1	1	1	0	1	0	**12**	**80%**
Government	**Government failure**	*Barriers and costs of doing business*	1	1	1	1	1	0	1	1	0	1	1	1	1	0	0	**11**	**73%**
Government	**Government failure**	*Unsustainable government finance*	0	0	1	1	1	0	0	0	0	1	0	1	0	0	1	**6**	**40%**
Government	**Government failure (and Market Failure)**	*Coordination failure*	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	**13**	**87%**
Overall environ-ment for develop-ment	**Stability (political stability, peace, inner security)**	Political instability	1	1	0	1	0	0	1	1	0	1	0	1	0	0	1	**8**	**53%**
Overall environ-ment for develop-ment	**Stability (political stability, peace, inner security)**	Poor institutions (rebuild-ing necessary, mostly post-conflict)	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	**3**	**20%**
Overall environ-ment for develop-ment	**Environmental risks**	Unsustainable natural resource exploitation	1	0	0	0	1	0	0	0	1	1	1	0	0	0	1	**6**	**40%**
Overall environ-ment for develop-ment	**Environmental risks**	Environmental risks (internal risks and climate change)	1	1	0	0	1	1	0	0	0	1	1	1	0	0	0	**7**	**47%**
Government	**Government failures**	Inadequate statistics	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**	**7%**
Overall environ-ment for develop-ment	**Culture**	Culture	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	**3**	**20%**
Overall environ-ment for develop-ment	**Population growth**	Population growth	1	0	0	0	1	0	0	0	0	1	1	0	0	0	0	**4**	**27%**
Private Sector and Investment	**Diversification**	Diversification (focus on export structure)	1	1	1	1	0	1	0	1	1	1	1	1	0	0	0	**10**	**67%**
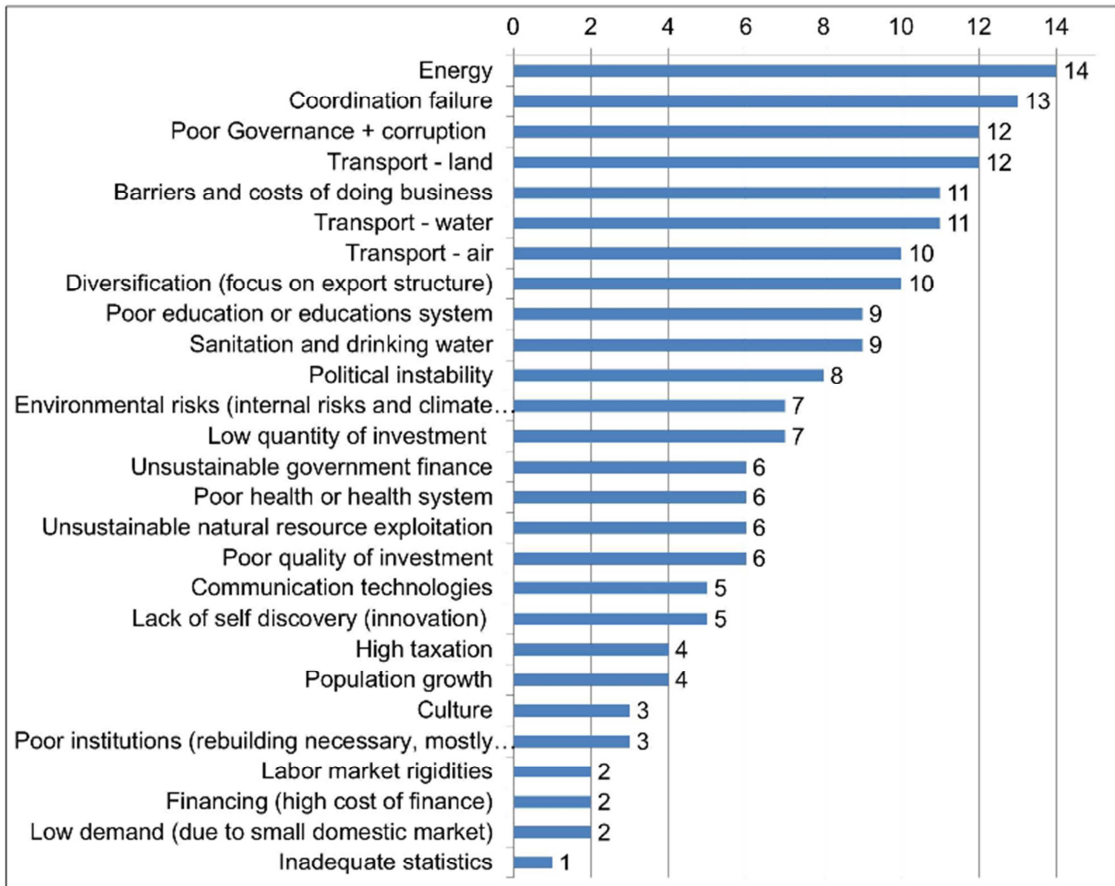
Figure 2-5: National constraints by frequency – graphical overview.

Table 2-6: Constraints by frequency of occurrence.

Country name			BEN	BFA	CPV	CIV	GMB	GHA	GIN	GNB	LBR	MLI	NER	NGA	SEN	SLE	TGO	Total	%
Document																			
Main context	**Sub-level**	**Constraints**																	
Government	Inadequate infra-structure	Energy	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	**14**	**93%**
Government	Government failure (and Market Failure)	Coordination failure	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	**13**	**87%**
Government	Government failure	Poor governance + corruption	1	0	1	1	1	1	1	1	1	1	1	1	0	1	0	**12**	**80%**
Government	Inadequate infra-structure	Transport - land	1	1	0	1	1	1	1	1	1	0	1	1	1	1	0	**12**	**80%**
Government	Government failure	Barriers and costs of doing business	1	1	1	1	1	0	1	1	0	1	1	1	1	0	0	**11**	**73%**
Government	Inadequate infra-structure	Transport - water	1	1	1	1	0	0	1	1	1	0	0	1	1	1	1	**11**	**73%**
Government	Inadequate infra-structure	Transport - air	1	1	0	1	0	0	0	1	1	1	0	1	1	1	1	**10**	**67%**
Private Sector and Investment	Diversification	Diversification (focus on export structure)	1	1	1	1	0	1	0	1	1	1	1	0	0	0	0	**10**	**67%**
Government	Human capital	Poor education or educations system	1	0	1	0	1	0	1	1	1	1	1	1	0	0	0	**9**	**60%**
Government	Inadequate infra-structure	Sanitation and drinking water	0	0	1	1	0	1	1	1	1	1	1	0	1	0	0	**9**	**60%**
Overall environment for development	Stability (political stability, peace, inner security)	Political instability	1	1	0	1	0	0	1	1	0	1	0	1	0	0	1	**8**	**53%**
Overall environment for development	Environmental risks	Environmental risks (internal risks and climate change)	1	1	0	0	1	1	0	0	0	1	1	1	0	0	0	**7**	**47%**
Private Sector and Investment	Investment and financing	Low quantity of investment	1	1	0	1	0	1	0	1	0	0	0	0	1	1	0	**7**	**47%**
Government	Government failure	Unsustainable government finance	0	0	1	1	1	0	0	0	0	1	0	1	0	0	1	**6**	**40%**
Government	Human capital	Poor health or health system	0	0	1	0	1	0	1	1	1	0	1	0	0	0	0	**6**	**40%**
Overall environment for development	Environmental risks	Unsustainable natural resource exploitation	1	0	0	0	1	0	0	0	1	1	1	0	0	0	1	**6**	**40%**
Private Sector and Investment	Investment and financing	Poor quality of investment	0	1	0	1	1	0	0	0	0	0	1	1	1	0	0	**6**	**40%**
Government	Inadequate infra-structure	Communication technologies	0	0	1	1	0	0	1	0	0	1	1	0	0	0	0	**5**	**33%**
Private Sector and Investment	Market failures	Lack of self discovery (innovation)	1	1	0	0	1	0	0	1	0	0	0	1	0	0	0	**5**	**33%**
Government	Government failure	High taxation	1	0	1	0	1	0	0	0	0	0	1	0	0	0	0	**4**	**27%**
Overall environment for development	Population growth	Population growth	1	0	0	0	1	0	0	0	0	1	1	0	0	0	0	**4**	**27%**
Overall environment for development	Culture	Culture	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	**3**	**20%**
Overall environment for development	Stability (political stability, peace, inner security)	Poor institutions (rebuilding necessary, mostly post-conflict)	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	**3**	**20%**
Government	Government failure	Labor market rigidities	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	**2**	**13%**
Private Sector and Investment	Investment and financing	Financing (high cost of finance)	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	**2**	**13%**
Private Sector and Investment	Market failures	Low demand (due to small domestic market)	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	**2**	**13%**
Government	Government failures	Inadequate statistics	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**	**7%**

Table 2-7: Regional constraints identified by ECOWAS.

Main context	Constraints		0 / 1
Government	Government failure	Barriers and costs of doing business	1
Government	Government failure	High taxation	1
Government	Government failure	Labor market rigidities	1
Government	Government failure	Poor governance + corruption	1
Government	Government failure	Unsustainable government finance	1
Government	Government failure (and Market Failure)	Coordination failure	1
Government	Government failure	Inadequate statistics	0
Government	Human capital	Poor education or educations system	1
Government	Human capital	Poor health or health system	1
Government	Inadequate infrastructure	Communication technologies	1
Government	Inadequate infrastructure	Energy	1
Government	Inadequate infrastructure	Sanitation and drinking water	1
Government	Inadequate infrastructure	Transport - air	1
Government	Inadequate infrastructure	Transport - land	1
Government	Inadequate infrastructure	Transport - water	1
Overall environment for development	Culture	Culture	0
Overall environment for development	Environmental risks	Environmental risks (internal risks and climate change)	1
Overall environment for development	Environmental risks	Unsustainable natural resource exploitation	0
Overall environment for development	Population growth	Population growth	1
Overall environment for development	Stability (political stability, peace, inner security)	Political instability	1
Overall environment for development	Stability (political stability, peace, inner security)	Poor institutions (rebuilding necessary, mostly post-conflict)	1
Private Sector and Investment	Diversification	Diversification (focus on export structure)	1
Private Sector and Investment	Investment and financing	Financing (high cost of finance)	1
Private Sector and Investment	Investment and financing	Low quantity of investment	1
Private Sector and Investment	Investment and financing	Poor quality of investment	0
Private Sector and Investment	Market failures	Lack of self discovery (innovation)	1
Private Sector and Investment	Market failures	Low demand (due to small domestic market)	1

Table 2-8: Constraints identified by ECOWAS and ECOWAS' institutional responses.

Main context	Sub-level	Constraints	Identified by ECOWAS	Institutional response
Government	Government failure	Barriers and costs of doing business	1	Existent (tangible results)
Government	Government failure	High taxation	1	Existent (limited tangible results)
Government	Government failure	Labor market rigidities	1	Existent (limited tangible results)
Government	Government failure	Poor governance + corruption	1	Existent (tangible results)
Government	Government failure	Unsustainable government finance	1	Existent (tangible results)
Government	Government failure (and Market Failure)	Coordination failure	1	Existent (tangible results)
Government	Government failures	Inadequate statistics	0	Existent (tangible results)
Government	Human capital	Poor education or educations system	1	Existent (tangible results)
Government	Human capital	Poor health or health system	1	Existent (tangible results)
Government	Inadequate infrastructure	Communication technologies	1	Existent (tangible results)
Government	Inadequate infrastructure	Energy	1	Existent (tangible results)
Government	Inadequate infrastructure	Sanitation and drinking water	1	Existent (tangible results)
Government	Inadequate infrastructure	Transport - air	1	Existent (tangible results)
Government	Inadequate infrastructure	Transport - land	1	Existent (tangible results)
Government	Inadequate infrastructure	Transport - water	1	Existent (tangible results)
Overall environment for development	Culture	Culture	0	Non-existent
Overall environment for development	Environmental risks	Environmental risks (internal risks and climate change)	1	Existent (tangible results)
Overall environment for development	Environmental risks	Unsustainable natural resource exploitation	0	Existent (tangible results)
Overall environment for development	Population growth	Population growth	1	Non-existent
Overall environment for development	Stability (political stability, peace, inner security)	Political instability	1	Existent (tangible results)
Overall environment for development	Stability (political stability, peace, inner security)	Poor institutions (rebuilding necessary, mostly post-conflict)	1	Existent (limited tangible results)
Private Sector and Investment	Diversification	Diversification (focus on export structure)	1	Existent (limited tangible results)
Private Sector and Investment	Investment and financing	Financing (high cost of finance)	1	Existent (limited tangible results)
Private Sector and Investment	Investment and financing	Low quantity of investment	1	Existent (limited tangible results)
Private Sector and Investment	Investment and financing	Poor quality of investment	0	Non-existent
Private Sector and Investment	Market failures	Lack of self discovery (innovation)	1	Existent (tangible results)
Private Sector and Investment	Market failures	Low demand (due to small domestic market)	1	Existent (tangible results)

2.5.2. Institutional responses by ECOWAS - discussion of each constraint

Government

Barriers and costs of doing business: In ECOWAS, the Commission's Private Sector Directorate, headed by the Commissioner for Macro-Economic Policy, holds the institutional leadership with regard to the relaxation of this constraint. Its main target is the creation of a "competitive, dynamic and diversified regional economy that is preferred by investors" (ECOWAS 2011b). Therefore, the mandate includes the issue of governance with regard to reducing barriers and costs of doing business. The directorate's activities are based on an ambitious work program (ECOWAS 2009), which will be also considered for other constraints. With regard to costs of doing business, the directorate is highly involved in facilitating stakeholder meetings on issues such as regional best practice policies and transparent policy making within the region (ECOWAS 2007). One example is the organization of the ECOWAS Trade and Investment Conference (ECOWAS 2012). Another part of its work is to lower information costs and advertisement for regional business which is reflected by the four ECOWAS Business Forums (since 2007) or the two China Economic and Trade Forums (2008 and 2012) (ECOWAS 2009). In addition, the directorate initiated a process to develop a region-wide investment code extending this approach to an investment guarantee/reinsurance agency. Both are supposed to lower costs of doing business significantly by facilitating the market entrance of new businesses (ECOWAS 2008, ECOWAS 2012i). As a consequence of the strong institutional response, this constraint can be labeled as identified and institutionally targeted.

High taxation: Regional elimination or harmonization of taxes is one of the objectives which the Commission's Private Sector Directorate formulates in its action plan (e.g. ECOWAS 2007, 16, 19). This action plan has been followed in two separate directions. First, there is the problem of taxation, transparent fixing of tax rates and transparent tax collection. In order to achieve these aims, ECOWAS cooperates with the private sector and in 2011 it established the West African Union of Tax Institutes (WAUTI) (WAUTI 2012b). Several action plans and numerous studies with recommendations have been written, for example for the International Tax Conference on Taxation on 28th February, 2012. However, the actual institutional response remains weak due to the fact that only Ghana, Nigeria and Mali have full membership and eight ECOWAS member states are not involved in any process. Therefore, this institutional response has yet to yield tangible results

(WAUTI 2012). On the other hand, taxation is part of the common market formation, one major objective of ECOWAS. One initiative in this context is the Movement towards a Common Investment Market (CIM) by the Commissioner of Macro-Economic Policy. The initiative focuses on harmonizing and lowering the corporate income tax rate. For this reason, a working group on fiscal policy harmonization has been established (ECOWAS 2007). The last update on the process of relaxing taxation as part of the CIM movement was a technical meeting comparing national investment laws and analyzing how the Community Investment Code (CIC) could be adopted nationally (ECOWAS 2011d). No change in the tax rate has yet been accomplished, but an institutional response exists. Altogether, institutional awareness and activities on the institutional level exist, but the institutional response has yet led only to limited tangible results.

Labor market rigidities: With regard to labor market rigidities, the focus has to be put on activities related to the education sector, as these rigidities depend on the lack of skilled labor - see section 2.2. Already in 2003, ECOWAS responded to this constraint by adopting a Regional Protocol on Education and Training (A/DEC.3/01/03) and a General Convention on the Recognition and Equivalence of Degrees, Diploma Certificates and Other Qualifications (A/C.I/01/03) (ECOWAS 2007b). These policy documents did not have a significant impact on the realization of activities in regional cooperation in education apart from conferences and work plans, for example a development of training curricula. ECOWAS is still working on the creation of a "coordinating unit for the harmonization of educational programmes and qualifications of tertiary institutions of member states" (ECOWAS 2011g). To allow for an educated judgment: besides having identified the constraint, low funding and limited staff hinder any realization of regional activities not considering the planning of activities (AU 2009). Moreover, related subjects, such as the ECOWAS Policy on Science and Technology (ECOPOST) have not shown tangible results yet despite the mere creation of these policy papers (ECOWAS 2012g). Besides these regional attempts, ECOWAS participates in the African Network of Scientific and Technological Institutions (ANSTI) which aims at increasing the supply of skilled human capital by free movement and higher quality regional research (AFDB 2009). Summing up, the regional institutions are aware of the problem, but as closer analysis reveals, region-wide responses have been realized only very limitedly.

Poor governance + corruption: In ECOWAS, several institutions, for example the Commissioner of Political Affairs, Peace & Security (PAPS) or the Court of Justice, focus on poor governance. This section discusses institutional responses with regard to transparency and electoral processes,

corruption and judicial issues. There are limitations to the analysis due to the extensive range of the constraint including numerous governance related issues, such as transparency or inadequate property rights. One important step towards relaxing the governance constraint – closely linked to the instability constraint – is the possibility for peaceful and transparent government changes.

In this context, the major document is the ECOWAS Protocol on Democracy and Good Governance (ECOWAS 2001, 5-13). In Article 1 the constitutional convergence principles are defined and further described by an explicit mentioning of elections and the role ECOWAS has played and could voluntarily play in this regard. This protocol seems toothless due to the fact that numerous member states were or are currently involved in political crises linked to power changes. Nevertheless, ECOWAS as a regional player is strongly involved in assisting electoral processes (Electoral Assistance Unit, EAU) and electoral monitoring, e.g. in 2012 by observer missions to Guinea-Bissau or Senegal (ECOWAS 2012d, ECOWAS 2012f). In response to the limited support ECOWAS can provide for national elections, a new institution, the ECOWAS Network of Electoral Commissions (ECONEC), was established in 2008. Strongly interlinked with the EAU, its main task is to establish electoral standards for the ECOWAS region. First steps are visible and can be seen for example in the publication of a comparative study as a baseline study for an ECOWAS protocol on common standards (Hounkpe 2011).

Among the poor governance constraints, corruption seems to be the most difficult to relax. Almost every document points out its importance, but at an institutional level, little has been achieved. In spring 2011, the Network of National Anti-Corruption Institutions in West Africa (NACIWA) was officially established under the Commission's Political Affairs Directorate (Democracy and Good Governance Division). However, its work has not yet resulted in any output except for meetings without any tangible result – the protocols only state that a meeting took place and who attended (ECOWAS 2010c, ECOWAS 2011f). Despite the fact that a regional commitment has been expressed by the speech of the ECOWAS Commissioner for Political Affairs, Peace and Security, this institutional response seems weak (ECOWAS 2011f).

Also important among poor governance issues is the judicial system. The institutional response by ECOWAS to this constraint is the Community Court of Justice, established by the Protocol A/P.1/7/91 (ECOWAS 1991). The court seems to have had a difficult start, since the appointment of judges took until 2001. Nowadays, the court is a functioning ECOWAS body which delivered 18

judgments in 2011. Compared to past activities this represents a substantial increase as from 2004 to 2009 only 27 judgments were delivered in total. With regard to governance it has to be highlighted that in 2005, the Court received the power to hear, inter-alia, cases related to violations of human rights, also by individuals (ECOWAS 2005). It can therefore be stated that there are activities at the regional level responding to poor governance.

Unsustainable government finance: The Directorate of Multilateral Surveillance, part of the Macroeconomic Policy Commission, is the major player with regard to stable government finances. It monitors and evaluates the macroeconomic performance of ECOWAS Member States and, with regard to an economic and monetary union, fosters the harmonization of national economic and financial policies. Thus, there is a regional "watchdog" for the member's government finance and therefore an institutional response in terms of stabilizing and controlling government finance (ECOWAS 2011b). On a separate note, with regard to development cooperation, no strategy of substituting development aid by other funding sources has been identified.

Coordination failure: "Given the numerous coordination challenges that afflict ECOWAS, the ECOWAS Trade and Enterprise Network, known as ECOWAS/TEN has been created to coordinate activities of the various TPOs [Trade Promotion Organizations] in the sub-region" (ECOWASTEN 2011). The ECOWAS-TEN, in cooperation with the ECOWAS framework for Export Promotion & Enterprise Competitiveness for Trade, provides institutional responses to selected coordination failures. For example, the network organized the ECOWAS trade forum which works on the improvement of value chains in the agricultural sector tackling problems from information inadequacies to transport coordination failures – for example transport cartels (ECOWASTEN 2011). Tangible results can be shown by the improvements displayed in the report on palm oil production, e.g. adopting common positions on production techniques and benchmark studies (ECOWASTEN 2012).

Inadequate statistics: ECOWAS has identified the low quality of data as a regional constraint. Its institutional response is named ECOSTAT. This institution provides statistics and data on its website, a tangible result. Furthermore, ECOSTAT engages in a program to develop statistical systems in West Africa and supports national statistical offices (ECOSTAT 2004). In addition to ECOSTAT, the Commission of Macro-Economic Policy hosts the Research and Statistics Directorate, whose research pillar is responsible for "technical expertise in economic policy

coordination, analysis and research." Thus, the ECOWAS internal statistics are also covered (ECOWAS 2012c).

Poor education or education system: Interestingly, the education strategies do not focus on structural changes of the national education systems. When analyzing the priority areas, only limited tangible results can be identified. As has been stated in connection to the constraint of labor market rigidities, ECOWAS did respond to constraints in education by adopting a Regional Protocol and a General Convention (ECOWAS 2007b). All priority areas of the ECOWAS education program suffer from limitations in funding and staff. The priorities are: 1) HIV/AIDS preventive education, 2) girls education, 3) teacher training through distance learning, 4) promotion of science and technology, and 5) technical and vocational education and training. With regard to the priority areas 3) to 5), little to no tangible results can be identified apart from policy documents (AU 2009).[11] In contrast, especially the first priority area has experienced strong political attention and, thus, education in HIV/AIDS has been adopted down to the national level (Bundy 2010). Besides AIDS/HIV, girls education is another priority area with tangible results. ECOWAS is chair of the United Nations Girls Education Initiative (UNGEI) West and Central Africa, which successfully implements girls education strategies (AFDB 2009). Again, despite no visible activities towards system changes, it can be stated that there are tangible institutional responses.

Poor health or health system: ECOWAS' institutional response with tangible results to this constraint is the West African Health Organization (WAHO). With its well-developed priority areas and a comprehensive monitoring of achievements on its website for each of these areas (WAHO 2009), it is obvious that ECOWAS does tackle constraints related to health and that it provides numerous tangible results.

Infrastructure - General overview: For the infrastructure constraints, a short review of the EBID activities shows that 60% of loans target infrastructure projects.[12] One infrastructure constraint will be discussed in detail due to its importance for ECOWAS: energy. For the other constraints, some examples illustrate the tangible results of ECOWAS' institutional response to the infrastructure constraints: Considering the constraint **Infrastructure - Air**, the EBID realized a partial financing of the extension of the Praia airport in Cape Verde (EBID 2011, 19). **Infrastructure - Transport- Water** as another constraint can be connected to the financing of the Dakar Port expansion - a

---

[11] Here again, the ANSTI has to be mentioned as a success with regard to the regional education programs (AFDB 2009).
[12] In the last 5 years of data availability (2006-2010) these loans have been around US$ 70 million.

project tackling one of the major bottlenecks of transport infrastructure in the sub-region (EBID 2009b, 5). The numerous achievements with regard to the **Infrastructure - Communications technology** constraint can be illustrated by the INTELCOM 1 initiative (also co-funded by EBID). This led to the construction of direct telephone links between selected ECOWAS member states (ECOWAS 2007c). With regard to the **Infrastructure - Land** constraint, the EBID portfolio reveals numerous road projects (EBID 2011, 19) and financing of a small rail related project, procuring tram trains in Senegal (EBID 2011, 34). In addition, the ECOWAS Commission is highly involved in the Fund for Development and Financing of ECOWAS Transport and Energy Sectors (ECOWAS-FODETE), which just recently published its feasibility study for transport and energy projects. As this fund receives substantial funding by partner organizations such as the African Development Bank (AfDB), the feasibility study can be seen as a first step in a continuous implementation process (ECOWAS 2012e). With regard to the constraint **Infrastructure - Sanitation and drinking water**, the Water Resources Coordination Unit (WRCU) has an extensive portfolio of activities –both projected and implemented (WRCU 2007). A problematic issue is the poor information policy of the WRCU or nowadays Water Resources Coordination Centre (WRCC) after 2008, so that the continuation of activities is only visible by indirect information such as the 400,000 Euro grant of the Agence Française de Développement (AFD) in 2010 (ECOWAS 2011e). However, ECOWAS provides an institutional response to this constraint with existent tangible results, such as mediation in large water projects. The limitation that sanitation is not mentioned in the WRCC's targets has to be noted.

The last infrastructure constraint, **Infrastructure - Energy**, will be discussed in more detail to show how much commitment to infrastructure exists in the regional policies: electricity in particular is clearly addressed by ECOWAS. Major policy papers such as the ECOWAS and WAEMU White Paper on Access to Energy Services and cooperation such as the energy partnership agreement of ECOWAS and the West African Economic and Monetary Union (UEMOA) highlight the activities targeting this constraint (ECOWAS 2006b). With regard to tangible results, the West African Power Pool (WAPP) has to be named as the major institution related to energy supply together with the ECOWAS Regional Electricity Regulatory Authority (ERERA). ERERA is responsible for regulations of the cross-border electricity interconnections in West Africa (ERERA 2012). The WAPP uses funds of more than US$ 150 million for its infrastructure investments and there is substantial activity with regard to actual construction (WAPP 2009). The West African Gas Pipeline Project (WAGP) is a complement to WAPP. The gas pipeline has been built with some delays but

since 2009, gas has been supplied from Nigeria to its neighbors – for example electricity production in the Takoradi Thermal Power Plant in Ghana is supplied by WAGP's gas (WAGP 2012). The EBID is another player which also funds WAPP projects but it also funds national infrastructure programs at the same time, e.g. grid extension in Benin (EBID 2011, 13).

With regard to future energy supply, ECOWAS established the ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) which works on fund raising and regulatory frameworks for renewable energy use. Furthermore, ECOWAS and EBID are involved in the African Bio-fuels and Renewable Energy Fund (ABREF) managed by the African Bio-fuels and Renewable Energy Company (ABREC). This Africa-wide fund operates mainly in the ECOWAS region due to the strong financial and political dominance of the ECOWAS countries in its structure (ABREC 2011). The objective of sustainable energy supply is dominant within ABREF's activities, thus, with regard to energy, an innovative perspective has been established.

It is apparent that the energy constraint receives great attention and strong institutional responses have been created. The activities show first region-wide results, e.g. the gas pipeline or interregional transmission lines.

Overall Environment for Development

Culture: Identifying activities targeting the cultural constraint is problematic as it does not relate to the typical cultural activities of ECOWAS. ECOWAS' activities focus on promoting cultural activities or exporting traditional goods. The constraint "culture" is more related to habits and traditions holding back development in the region. One of the efforts ECOWAS undertakes in this respect are activities of the ECOWAS Gender Development Center (EGDC) (Dibba 2010). Regarding culture as a constraint is quite a radical statement. However, it has been identified as a constraint, yet ECOWAS is currently not aware of this constraint and it provides only very limited institutional responses.

Environmental risks (internal risks and climate change): The ABREC and the ECREEE, already described with regard to the energy constraint, are part of a climate change mitigation strategy. The ABREC focuses on tons of CO_2 savings via its projects. It has been shown that with its current projects, ABREC saves almost 70,000 tons of CO_2 per year. These activities demonstrate that ECOWAS realizes activities in climate change mitigation (ABREC 2011, 18). ECREEE

activities are less tangible as they focus more on awareness creation and regional and national regulatory framework creation or changes to national frameworks. With the combination of both institutions, ECOWAS realizes an institutional response to this constraint (ECREEE 2010). Besides this fast-track proof of tangible results, it is the ECOWAS Environmental Policy, adopted in 2008, which binds member states to consider environmental principles in all ECOWAS activities. Furthermore, this policy includes an Action Programme for Adaptation to Climate Change Vulnerability in West Africa (ECOWAS 2011b). For the next constraint this policy is discussed in more detail.

Unsustainable natural resource exploitation: In a Supplementary Act, the ECOWAS Heads of State and Government decided that the ECOWAS Environmental Policy will be "part of the ECOWAS vision" (Article 4) and the ECOWAS treaty (ECOWAS 2008c, Article 20, 2.). Within this policy, four strategic lines for action include amongst others the "Promotion of sustainable management of Resources for the improvement of an environment-friendly sub-regional economy" (ECOWAS 2008d, 19). Examples for tangible results resulting from this detailed and ambitious strategy are the African Monitoring of the Environment for Sustainable Development (AMESD) 2008-2013 which is implemented in cooperation with the European Development Fund and aims to create information management capacity and earth observation technologies. Another example is the ECOWAS Forest Policy which was adopted by the member states in 2010 (ECOWAS 2011b).

Population growth: The population constraint is clearly identified in recent ECOWAS documents. However, there is no direct institutional response. It could be argued that health and gender related programs are generally indirectly linked to population growth. Further, economic growth and more efficient production tackle an issue related to population growth, scarcity of resources. Nevertheless, no strategy document introduces this argumentation. Thus, ECOWAS seems to lack institutional responses with regard to population pressures.

Political instability: Political instability has been identified nationally and regionally as a major constraint. Not only has ECOWAS produced tangible results, these results even serve as an African role model for regional cooperation with regard to political instability. To name one example, ECOWAS member states officially established a Standby Force (ESF) in a protocol in 1999 and since 2005 a Task Force (TF) of 2,773 all ranks has been maintained. Today, the military and police components are judged as fully operational by the African Union. Further institutional responses

include strict rules which are applied to the membership to this regional cooperation. For example, due to a zero-tolerance policy for unconstitutional change of government, Niger's government has been expelled from cooperation. Even funding is raised in the region, with more than 80% of the budget paid by ECOWAS members themselves. Besides the possibility of intervention, conflict prevention plays a major role in the ECOWAS framework. Here, the ECOWAS Peace Fund or the ECOWAS Council of the Wise provides projects or mediation support to overcome national conflicts. The former is involved in projects such as anti-corruption initiatives amongst a wide range of projects which are supposed to increase political stability (Fisher 2010). With regard to the large amount of ECOWAS institutions and actual activities targeting political stability, this constraint has numerous regional institutional responses.

Poor institutions: In addition to conflict prevention, the rebuilding and strengthening of institutions is another major factor for the improvement of post-conflict development. The focal point of ECOWAS' institutional response is the support of democratic institutions in each member state. In this context, ECOWAS provides institutional responses with regard to electoral assistance and capacity building. In particular, election processes and political parties are targeted, but also legislative bodies, the judiciary and the media, as well as human rights and anti-corruption institutions. It has been discussed previously (see poor governance constraint), that ECOWAS as a regional player is strongly involved in assisting electoral processes and electoral monitoring. Further activities are implemented with regard to political parties, corruption and the findings of previous peace building missions (ECOWAS 2010d). Neither process has yet led to tangible activities but plans exist, such as the current struggle to implement a Forum of West African Political Parties (FOWAPP). In summary, ECOWAS provides a limited but visible institutional response to this constraint.

Private Sector and Investment

Diversification: With regard to diversification, the major institutional response is the ExPECT initiative which targets export competitiveness and the increase of exports (see the constraint "coordination failures"). As a tangible response in 2012, the ExPECT initiative started advanced training and consulting work with regard to value chain development and improvement (EXPORTACTORSFORUM 2011). Another institutional response has resulted from an ECOWAS-EU cooperation: the Economic Partnership Agreement Development Programme (EPADP). Here,

one major goal is diversification and increase of production capacities (ECOWAS 2012b). Thus, due to ExPECT there are tangible results for this constraint.

Low quantity of investment: ECOWAS seeks to install a common investment market. While the common market has not yet been installed, concrete activities such as comparative studies, investment policy assessment, etc. are in progress (ECOWAS 2012d). One tangible result in this process is the establishment of an ECOWAS Investment Guarantee/Reinsurance Agency which will be used to channel flows of foreign direct investment (FDI) in order to increase FDI (ECOWAS 2012h, 2012i). In addition to these activities, EBID itself is a vehicle for investments and, further, it supports numerous banks and funds in the region (EBID 2011). Thus, altogether, the investment constraint receives limited institutional responses by ECOWAS' institutions.

Financing (high cost of finance): EBID is the main institution dedicated to lowering the high costs of financing in the region. It provides finances for SMEs, both directly and by supporting commercial banks with credit line grants. It increases the total amount of finances and provides the potential to lower financing costs (EBID 2009). Nevertheless, this is a relatively weak and indirect response to this constraint. Therefore, only a weak institutional response is identified.

Poor quality of investment: This constraint was implicitly identified in the discussion on the common investment market which revealed that FDI is sufficiently high in the oil sector but very low in other sectors (ECOWAS 2012i). Furthermore, most programs such as ExPECT, which are designed to increase value chain efficiency in selected sectors, implicitly target increasing investments in these sectors resulting from higher profitability. Nevertheless, despite general activities to increase FDI, a strategy or activities with the objective of channeling investment to different sectors could not been identified. Thus, there is no institutional response.

Lack of self-discovery (innovation): With regard to innovation, EBID has a mandate to invest in innovation, but only two projects could be identified in its portfolio which respond to the constraint: The Tinapa Free Zone Project in Nigeria, a free trade zone partially related to the self-discovery idea (EBID 2011, 32), and the biotechnology and ICT project in an export processing zone in Cote d'Ivoire (EBID 2011, 32), which is more obviously related to innovation. These small projects are the only institutional responses identified, but with regard to the urgency of other constraints, such as political instability or poor infrastructure, the smaller commitment seems reasonable.

Low demand (due to small domestic market): The low demand constraint is clearly one of the major reasons for ECOWAS' existence. Currently, institutional responses are mostly covered by the World Trade initiative: ECOWAS - Aid for Trade. Within this initiative, the ECOWAS Trade Liberalization Scheme (ETLS) is the program targeting the common market. Some recent tangible results of this program are a capacity building workshop for regional experts on the mechanism and procedure for ETLS operationalizing (ECOWAS 2012) and the opening of two pilot border information centers (ECOWAS 2011f). Thus, ECOWAS is implementing activities by its institutions to relax this constraint.

3. Simplifying evaluation of potential causalities in development projects using Qualitative Comparative Analysis (QCA)

3.1. Introduction

This paper focuses on QCA as an evaluation approach for program theory in development cooperation. Evaluation is crucial for development cooperation as there are ongoing discussions on its legitimacy. To assess any proof of its usability, evaluation is used. Especially when analyzing the determinants of success or failure, evaluation should test a certain hypothesis on the causal link between project inputs and results through predefined transmission channels (Weiss 1972). This type of evaluation is defined as theory-based evaluation or program theory evaluation. It uses program theory, which describes how the program is supposed to achieve its intended results, and tests this theory empirically (Rogers et al. 2000). Each program or project proposal has an explicit or implicit program theory that demonstrates its rationale for achieving results. The theory component could be an advanced theory, a plausible model or an implicit rationale of how a program is supposed to function (Owston 2008). I will apply such a theory-based evaluation in the following analysis.[13] Randomized Controlled Trials (RCTs), the most rigorous – though often debated – evaluation technique in terms of identification, is not applicable for many evaluations. Nevertheless, other evaluation techniques exist that are able to provide an approximate answer to the causal question. Qualitative Comparative Analysis (QCA) is such an evaluation method. Based on a program theory, it allows one to prove or disprove if observable outputs or outcomes are in line with this program theory (Funnell and Rogers 2011, 470-74), (Ledermann 2012). With its basis within theory-based evaluation, QCA has the potential to play a role in the recently increasing discussions on theory of change (for an introduction see Mason and Barnes (2007)). While this

---

[13] Many evaluation approaches follow the idea of a given program theory with input factors correlating with the project outcome. Some examples are: logical framework analysis (LFA), result based management (RBM) or impact pathway evaluation. See Engelhardt (2010, 72).

discussion seems only a variation of the theory-based approach, its increasing importance in evaluation and in development cooperation could be a door opener for QCA.[14]

Since its development by Charles Ragin (1987), QCA has been proven to be a useful tool for policy analysis mostly at the macro level. But up to now, QCA has rarely been used in evaluation. Only recently has the potential of QCA received increasing attention in the literature.[15]. Befani, Ledermann, and Sager (2007) show that QCA produces empirically well-grounded and context-sensitive evidence and Rihoux, Rezsöhazy, and Bol (2011, 55) point to the fact that its results are "easy to grasp" and "quite complex due to their combinational nature".

In addition to the theory-based evaluation, QCA is also discussed within the approach of realistic evaluation. Notably, Sager and Andereggen (2012) and Ledermann (2012) highlight the potential of QCA for realistic evaluation (see more on this approach in Pawson and Tilley (1997)). Within these approaches, first, I discuss QCA's potential of falsification of program theory, and second, its potential to identify and advance such a program theory. As Ragin and Rihoux (2009, 175) point out: "the use of QCA for hypothesis-testing is not yet explored and bears a high potential as joint effects of conditions have not yet been widely exploited." I will show that QCA is a strong tool for this purpose.

The case study in this paper is a rural electrification program in Senegal. This case study shows the typical problems when evaluating development projects such as formulating the implicit program theory or data limitations. In this context, QCA proves to be an accessible tool for evaluating program theory and analyzing the effect of single conditions and explicit configurations with regard to the project success, which is to achieve a previously set electrification rate. After discussing the different conditions and setting up two program theories, I apply a crisp-set QCA (csQCA) to identify and compare the empirical configurations present to the configuration given by the program theory. In addition, I discuss the results with the further developments multi-value (mvQCA) and fuzzy-set QCA (fsQCA).[16] While csQCA allows only dichotomized variables, mvQCA allows more categories for one condition than the absence/presence dichotomization of csQCA. FsQCA includes

---

[14] Some examples for the current discussions on theory of change can be found in Vogel (2012) and Stein and Valters (2012). For the basic theoretical discussions on theory of change within theory-based evaluation see Weiss (1997).
[15] For examples discussing QCA's potential for project level evaluation and QCA's theoretical backing in evaluation see Balthasar (2006), Befani and Sager (2006), Sager and Ledermann (2006), Befani, Ledermann; and Sager (2007), and Sager and Andereggen (2012).
[16] Further, I included a regression analysis to discuss the effect of single conditions which can be found in appendix 3.6.2.

a membership score for each condition, describing if the actual value is more present or absent with regard to a crossover threshold.[17] Their results do not differ significantly from the findings in csQCA which is therefore recommended as a starting point for QCA based program theory evaluation.

This study shows that QCA is effective in falsification of a program theory. With the data of this case study, QCA cannot prove a program theory right. But it can easily falsify the assumptions of the program. By that QCA proves to be a strong evaluation tool for quick assessment of program theory, however, construction of program theory remains difficult – which is a general issue for approaches for proving or constructing program theory. Additionally, it makes it possible to assess whether data, indicators, and their combinations have any causal relations to program success. As the process of advancing theory is an iterative process with much discussion on relevance of selected variables, this process is not as straightforward as the falsification. This presents a challenge to displaying the potential of QCA's results. Therefore, when advancing theory, QCA seems promising as part of a methodological mix. For example, in the pragmatic approach of evaluation by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) (Dinges and Schweitzer 2013), QCA could be of use in assessing the formulated program theory and discussing the role of chosen indicators. As evaluation of the appropriateness of a program theory is one major task of evaluation in development cooperation, QCA should be considered especially when discussing replicating or scaling up a project.

The remainder of the paper is organized as follows. The second section presents a short introduction to QCA, the data used and the different conditions and program theories. In the third section, I apply a csQCA, while the fourth section discusses the results of applying mvQCA and fsQCA. Section five compares the results of QCA to a typical quantitative regression analysis. In the sixth and final section, I draw my conclusions.

---

[17] For a detailed introduction to mvQCA see Cronqvist (2006), Cronqvist (2007), Cronqvist and Berg-Schlosser (2009, 69-72), Berg-Schlosser and Cronqvist (2011), and Thiem and Dușa (2013, 83-90). For a detailed introduction to fsQCA see Ragin (2000, 153 et seqq.) and Ragin and Rihoux (2009), for accessible introductions on setting the membership scores, defined as calibration, see Ragin (2008, 71 et seqq.) or Wagemann and Schneider (2007) and for some examples of practical applications see for example Emmenegger (2011). A detailed description on how to apply the software R for fuzzy sets can be found in Thiem and Dușa (2013, 51 et seqq.).

3.2. QCA and testing program theory

In social science, causation is often multiple and conjunctural, thus different combinations of circumstances lead to the same result. In this context, QCA solves simple paradoxes such as "[cases] A and B are different. Yet both experience outcome Y. What causally relevant similarities between A and B explain this common outcome?" (Ragin 1987, 33-45). For an introduction to the development of QCA see Ragin (1987, 84) and Ragin and Amoroso (2011, 161).[18]

QCA offers two possibilities to analyze program theory: first I discuss falsification, second, the identification or advancement of the theory. Both are based on the core element of QCA, the truth table analysis. The basis for the truth table is the individual cases which will be analyzed, e.g. countries or projects within a program. As preparatory steps, cases have to be identified and the outcome and the conditions have to be identified and discussed with regard to their causal relation. These steps of the analysis are based on the research question and theoretical considerations found in case specific documents or more generally in the corresponding literature. In csQCA the values of the conditions are dichotomized so that they are either present (1) or absent (0). The conditions form the columns of a truth table together with a definite outcome – which is also a dichotomized variable representing an indicator describing content connected to the research question, e.g. project success. Each case consists of a specific combination of condition values and the outcome. This is called a configuration. If there are two cases with the same configuration, they are displayed in one row. Thus, the truth table displays different configurations, logical combinations of conditions.[19] Once all configurations can be displayed in the truth table, QCA applies Boolean logic to identify the conditions which are causally relevant for the positive outcome.[20] This Boolean minimization consists of the following logic: if two configurations with the same outcome differ in only one condition, this condition is irrelevant when identifying the key conditions leading to the outcome. For more detailed descriptions of the process of truth table minimization see Berg-Schlosser et al. (2009), Ragin and Amoroso (2011), and Rihoux and Ragin (2009).

With regard to program theory we find this theory as a specific configuration within this truth table. For example, conditions could be activities or certain context variables. The solution of the

---

[18] Appendix 3.6.1 is an amendment to this essay and provides a detailed introduction to QCA.

[19] This explanation does not discuss cases which are not empirically identified as logical remainders are not included in the analysis.

[20] George Boole was the first to develop an algebra that deals with variables with only two possible values, i.e. dichotomous values such as "0"and "1". Ragin (1987, 85) names it the "algebra of logic".

minimization process for a truth table has to include this program theory. Only then is the program theory fully consistent with empirical findings and all conditions with their specific values are relevant for the presence of the outcome. This is empirical evidence for the actual importance of the theoretically established conditions, the program theory, with regard to the positive outcome. In this context, it is important to note that QCA enables one to identify program theory but not to verify the causal evidence identified with this configuration. If the configuration is not identified, the program theory can be rejected. For the analyzed cases, it is falsified as empirically relevant. This result leads to the question of how to identify or advance the program theory to fit the empirical evidence.

This second way of discussing program theory can be based on the truth table analysis and on consistency and coverage scores for the necessity or sufficiency of single conditions or selected combinations of conditions. Already, the results of the truth table analysis allow one to interpret which configurations can be identified as relevant for the outcome. Thus, these different configurations are different potential program theories which do not exclude each other due to the equifinality of QCA. First, it should be assessed if the previously defined program theory is somehow related to the identified configurations – e.g. single conditions could be excluded so that a condensed form of the previously defined program theory can be identified. In addition, each configuration displays a solution for the program theory and has to be discussed on a functional basis. The previously established program theory and its theoretical considerations have to and can be discussed in QCA. Though conditions and the respective configurations are expressed ex-ante, the analytical framework is flexible and open to new results and thereby new causal conditions (Ragin and Amoroso 2011, 139-42). This openness interconnects the deductive process of placing a theoretical frame for the QCA and the inductive process of changing the settings due to findings of new "ingredients" (Berg-Schlosser et al. 2009, 6). Besides the potential to change the truth table basis by including or excluding further conditions, the reliability of a finding has to be discussed as well. QCA presents each configuration equally. But despite the importance to allow for different solutions, it is also necessary to incorporate frequency criteria when discussing and interpreting results. If some outliers strongly diversify the results, they have to be assessed individually (Ragin 1987, 88).

While the truth table analysis is a top-down approach as it starts with the configurations present and minimizes them from this starting point, a bottom-up approach adds further information to the truth table analysis. This bottom-up approach consists of analyzing the necessity or sufficiency of

conditions or selected combinations of conditions. Necessary conditions are identified in a given dataset by finding conditions which are always fulfilled when the outcome is also present. A bottom-up sufficiency analysis is conducted similarly. The dataset is searched for sufficient conditions, thus conditions which are present when the outcome is present. This analysis of necessity and sufficiency for single conditions can also be conducted for selected combinations of conditions. While analyzing single conditions is straightforward when following the bottom-up approach, constructing combinations of conditions requires a theoretical backing to allow a meaningful analysis (Wagemann and Schneider 2007, 58-59). In general, this analysis of necessity and sufficiency is a deterministic analysis. It identifies conditions either as necessary or not. But it is also possible to calculate a possibilistic ratio to determine how necessary or sufficient a selected condition or configuration is. This ratio is the consistency score, also defined as inclusion[21] (Ragin 2006). In deterministic analysis, a necessary configuration has to have a score of 100%. But a lower consistency threshold can be used to discuss partly necessary or sufficient conditions. Possibilistic causal relations, thus partly necessary or partly sufficient conditions need to be interpreted with care. Nevertheless, they can provide further insights into the data structure (Wagemann and Schneider 2007, 58-59). In addition to the consistency ratio, it is possible to display the coverage rate. This coverage rate shows how many cases of the total number of cases with the outcome value that has to be explained are covered by the necessary or the sufficient condition or configuration. In the case of a deterministic analysis, this score has to be 100%. Again, it is possible to allow for a lower threshold. Coverage is only interpreted for consistent results as coverage for inconsistent results is not a meaningful indicator (Wagemann and Schneider 2007, 86-209). Necessity and sufficiency ratios can add further details to discuss the results of the minimization process. This is especially important when the program theory or a nested sub-configuration cannot be identified as a sufficient configuration (Ledermann 2012).

In this research I follow the general process of QCA: it begins with the analysis of the necessary conditions. After discussing if one or more conditions or configurations are preconditions for the outcome, the next step, the truth table analysis, is conducted. Calculating the consistency and coverage rates for the conditions and selected configuration of interest can then provide further information for the interpretation of the truth table minimization. For the calculations and the minimization process I use the software R with the packages QCA (Thiem and Duşa 2013) and

---

[21] Ragin (2006) defines the two indicators as consistency and coverage while the QCA package in R uses the wording inclusion and coverage, see Thiem and Duşa (2013, 33).

QCA3 (Huang 2012) which allows conducting all three QCA approaches with open-source software.[22]

3.3. Data and program theory

3.3.1. Case study "Rural Electrification Senegal" (ERSEN)

This case study uses data from the rural electrification program ERSEN (Electrification Rurale pour le Sénégal) in Senegal. ERSEN is implemented under the roof of the Senegalese Agency for Rural Electrification (ASER) through the GIZ Program for the Promotion of Renewable Energy, Rural Electrification and sustainable Supply of Household Fuels (PERACOD) in cooperation with local initiatives. The main goal is to use solar and wind power to "provide electricity to remote areas that cannot be immediately or easily connected to the existing distribution grid" (PERACOD 2011a, 1). ERSEN is currently in the second phase. In the first phase from 2006-2009, 74 villages were provided with electricity. In 2009, the second phase started which has the objective to provide another 191 villages with electricity (PERACOD 2011b).

ERSEN has two main objectives: the quantitative outreach of electrification and the increased usage of electricity. The quantitative targets focus on the number of connected households, social institutions and local businesses. With regard to electricity usage, the main project objective is domestic use. In addition, the focus is put on public use through social infrastructure (schools, health huts or health posts, and community centers) and productive use. In the program theory, these two components are linked to the overall objective of increasing domestic use: Productive usage is understood as a means to stimulate demand but also to create employment and income and thereby to contribute to the financial and economic feasibility of rural electrification. Social institutions are a necessary means to increase acceptance and thus dissemination of renewable energies. Consequently, ERSEN aims to electrify one school and one health hut or post per village (PERACOD 2013).

As Ragin and Amoroso (Ragin and Amoroso 2011, 143-44) state, the cases that are analyzed have to be part of a delimited empirical category. This means they are: specific to the researcher's

---

[22] Different software for QCA exists, but R is available for free and continually provides a multitude of further developments. An introduction to the different software can be found on COMPASSS (2013). For an introduction to the R packages, see Thiem and Dușa (2013).

interests and to those of the intended audience; clearly limited in time and space; and part of a limited, existing and coherent set of comparable cases. In general, it is the research question that determines the case selection. This guarantees that cases share comparable background characteristics that explain the outcome (Ragin and Rihoux 2009, 24-25). In this study, the cases are the projects that have been implemented by ERSEN. Due to data availability, the number of used cases is restricted to 29 of the 32 villages electrified in the Kaolack region, which are part of the 74 villages electrified in the first phase (PERACOD 2011b).

3.3.2. Program theory and the data set

The selection of conditions is based on the program theory that states links of activities and outcomes. The exclusion of conditions is often impossible ex-ante. Nevertheless, the QCA process should focus on a minimum number of conditions, as the logical space should provide enough room for the discussion of cases, and not only for logical combinations of conditions. To identify a limited number of conditions, only those which vary over cases are considered useful as they provide additional information and do not exactly replicate the pattern of another condition (Ragin and Rihoux 2009, 24-25). The suggested number of cases and conditions are "10-40 cases with 4-7 conditions" (ibid: 28). To allow for the validation and replication of the process, for each condition a clear hypothesis regarding its connection to the outcome has to be formulated.

There are two program theories which will be considered for the analysis. Both are deducted from the program documents and through interviews with the persons responsible for the project. The first theory is the basic program theory, which is deducted from the major inputs defined in the program documents. The second, more advanced theory, includes further context and program specific factors but is limited due to data availability and strong correlations within the different conditions. Both selections are not only based on the data and literature review but have been discussed with the responsible persons in Senegal to ensure its actual applicability to the practical project implementation.

The first program theory can be displayed as follows:

technology * social institutions * productive use * operator → outcome

(program theory 1 with 4 conditions)

The outcome is the project's success measured as the ratio of the actual achieved electrification rate to the ex-ante planned electrification rate. This research focuses on the actual objective of the project namely to increase or create access to electricity. The project's effects on sustainable development would be another, much more challenging aspect of the evaluation, which needs much more field work to collect a wider data base and a rigorous mixed methods approach.

The projects offer certain similarities and differences which are linked to the selected outcome to identify necessary and sufficient conditions and configurations. Based on the implicit program theory, the first condition is the technology for electrifying the villages. Two types of village electrification can be distinguished: solar home systems (SHS) and mini-grids with solar or hybrid systems (solar, wind, diesel).[23] The technologies condition has two "values": SHS or hybrid. The second and the third condition are the additional activities with regard to electrification: the electrification of social institutions and productive use on the basis of electrification. Both are identified as a means to stimulate electrification. For productive use, the data allows only a dichotomization, for example if there is or if there is not productive use driven by electrification in the selected village. For social infrastructure, there are three different possibilities: existing but not electrified social infrastructure, only partial electrification or total electrification of existing social institutions. As a last condition, the institutions involved in the technical implementation, the operators, are included: NSRESIF and EnergieR/MSOA, two private companies based in Senegal.

The second, more advanced program theory combines the first theory with additional conditions:

program theory I + school + health + public lighting +

coverage planned + population + geographic context variable (development) → outcome

(program theory 2 with 10 conditions)

This program theory is a further development of the basic program theory which I based on the preliminary results of QCA on program theory I. It underlines the iterative process of QCA as first results demand a further development of the underlying analytical frame. The new conditions are based on theoretical considerations, data availability and the reconsideration of the truth table due to a large number of contradicting configurations. I developed this program theory to discuss whether there is a possibility to find clearer solutions when advancing theory. As conditions with

---

[23] A third possible technology, the grid extensions of the national grid, has not been used yet.

supplementary information, I include the existence of a school or a health post in the village and the installation of public lighting by the project. The logic for including these additional conditions is similar to the one of electrification of social institutions. Public lighting supports the acceptance and thereby the dissemination of electrification by its visibility and usability to the village. The existence of a school and a health post are also linked to acceptance because of visibility and the possibility to disseminate information on electrification. Additionally, the presence of these institutions points to a certain level of development of the village. The population of the villages is also included as a condition to examine the difficulty of achieving a given coverage rate in a bigger village. Furthermore, as the planned coverage rate of electrification differs throughout the cases, it is also considered as a condition. The reasoning is similar to the one of village size, that it is not equally difficult to achieve a low or high coverage rate. Lower planned coverage could lead to more positive outcomes. Data for these conditions are derived from PERACOD documents and data sheets.

Along with these project immanent conditions, one geographic context variable complements the analysis. The villages are all located in the Kaolack region in Western Senegal. Two documents of the Senegalese Government (Ministère de l'Economie et des Finances de la République du Sénégal 2011; Ministère de l'Economie et des Finances de la République du Sénégal 2009) show that differences exist in the access to basic social services at the district level within the region. The Kaolack district and the Guinguiéno district have a development index of 450 and the Nioro du Rip district an index of 350, which represent different development levels. This index is based on a combination of 5 variables which describe the access to basic social services (drinking water, primary school, health post, market place, and road) (Ministère de l'Economie et des Finances de la République du Sénégal 2011, 11). The index value of 450 indicates that 85% of the population has access to social services, the value of 350 that only 70% have this access. I assume that a lower development index makes it more difficult to achieve a positive outcome. The analysis includes the district to check for these differences.

When compared to the suggested number of 4-7 conditions for our number of cases, the number of conditions in this advanced theory is high (Ragin and Rihoux 2009, 28).[24] In total, the analysis

---

[24] Some promising conditions had to be excluded beforehand or due to further information obtained by an interview with the project staff as they were not yet implemented or did not vary between the cases: The use of microcredit, the fees for electricity, the installation costs as well as the implementation-organization (ERSEN).

includes a maximum of 29 cases, one outcome variable and four conditions for the first, basic program theory and ten conditions for the second, advanced theory.

3.4. Applying QCA to evaluate program theory

3.4.1. Dichotomization

First, I apply csQCA to discuss QCA results with the most common and most accessible QCA method. The data available allows me to create a dataset for each described program theory. For the csQCA, all data has to be dichotomized. Six variables have to be dichotomized while the remaining ones already have presence/absence values and can be coded directly with 0 for absence and 1 for presence of the condition. The variable technology is coded 0 for SHS and 1 for hybrid and the variable operator, indicating the institutions involved in the technical implementation, is coded 0 for NSRESIF and 1 for EnergieR/MSOA.[25] Thus, dichotomization is necessary for the electrification of social institutions, population size, planned coverage rate, public lighting, geographic context, and the outcome – the percentage of planned electrification rate achieved with the project.

For the condition electrified social institutions (social), the dichotomized variable has either a value of 0 for social institution without electricity or a value of 1 if at least one or all of the existing institutions are provided with electricity (1). Public lighting is a variable that counts the lamps installed in public space. For public lighting (publight), manual dichotomization is possible as I code the actual existence of new electric public lighting with 1 and no existence with 0. It is expected that even one lamp can have a strong dissemination effect in a village – especially as the maximum is the installation of only five lamps. The geographic context variable (geo) will be dichotomized by their two values. The district Nioro du Rip has the lower development with an index value of 350. This value is coded 0 as it describes the lower development value. Accordingly, the geographic context variable is coded 1 for the two other districts with the higher index value of 450. Thus, the logic of the dichotomization is to give a condition the value 1 when the characteristic of the condition makes a positive outcome more likely (Rihoux and de Meur 2009). The outcome measure is given by the realization of the planned coverage rate in percent. Thus, if 50% of

---

[25] This dichotomization is arbitrary as there is no clear indication which technology and which operator is clearly related to a positive outcome. If successful, QCA will later provide the information which technology (o=SHS or hybrid=1) and which operator (0=NSRESIF or EnergieR/MSOA) can be related to a positive outcome and thus can be coded 1 in a following QCA.

coverage is planned and the realization is 40%, the outcome value is 80%. For this condition, manual dichotomization is possible, as 100% is what the project targets and therefore indicates the project's success. A successful project is coded (1) when the achieved electrification rate reaches the planned coverage rate – if this objective is not achieved I code the outcome (0).

For population and the coverage rate, dichotomization is more complicated. Here, we need to find a threshold that makes it possible to divide both interval scaled variables into a group with lower values which can be coded 0 for coverage rate or 1 for population and a group with higher values which can be coded with 1 or 0 respectively. The direct, manual setting of a threshold is not possible, as the structure of the data does not show a clear structural discontinuity. Therefore, I cluster population (pop) and coverage rate (cov_planned) with the Wards minimum variance method which minimizes the total within-cluster variance.[26] This method constructs two clusters of the condition's values which form two groups which are the most similar two groups possible. With this method, the lower population can be defined as a population below 484.5 and the higher population can be defined as the population above the threshold of 484.5. As the coding should correspond to theoretical considerations, the low population below 484.5 is coded with the value 1 because we expect that a low population is connected to a positive outcome (Rihoux and de Meur 2009, 43).[27] For the planned coverage rate, the threshold is 71.5% which divides the variable values in a lower and a higher group. Following our hypothesis that low planned coverage is linked to a positive outcome, the low coverage rate, below 71.5%, is coded (1). Above this threshold of 71.5%, coverage rate is coded (0). Having performed this calibration, the two final csQCA datasets can be displayed in Table 3-1.

---

[26] For a detailed description of this clustering method see Backhaus et al. (2000, 355-70). In addition to this clustering method, I use the threshold setter of the software TOSMANA to visualize and compare our clusters. This visualization and the use of the "threshold setter" which is included in the software does not lead to different results.
[27] For more information on good practices on dichotomization see Rihoux and de Meur (2009, 42-43).

Table 3-1: Dataset for all conditions included in the two program theories.

case	Tech	op	geo	prod-use	social	school	health	pub-light	pop-ulation	cov_ planned	out
Darou Diadji	0	1	1	1	1	0	1	1	1	0	1
Darou Khoudoss	0	0	0	0	1	1	1	1	1	0	1
Darou Matar	1	0	0	0	0	0	1	0	0	1	1
Diamsira	0	1	1	0	1	1	0	1	1	0	1
Keur coumbadaga	0	1	1	0	1	1	1	1	1	0	1
Keur Diaga Dialé	0	0	0	0	1	1	1	1	1	0	1
Keur Madiouf	0	1	1	0	1	1	1	1	1	0	0
Keur Samba Diama	0	0	0	0	1	1	0	1	1	0	0
Keur Taibe	0	1	1	0	1	1	1	1	1	0	0
Kounkoung Thialene	0	1	1	0	1	1	0	1	1	0	1
Naoulerou	1	0	0	1	0	1	1	0	0	1	0
Ndelle	1	0	1	1	1	1	1	0	0	1	0
Ndiagne Kahone (SHS)	0	1	1	0	1	1	1	0	0	1	0
Ndiagne Kahone (hybride)	1	1	1	1	1	1	1	0	0	1	0
Ndiayene Poste	0	0	0	1	1	1	0	1	1	0	1
Ndimb Birane	0	0	0	0	1	1	0	1	1	0	1
Ndimb Taba	0	0	0	0	1	0	1	1	1	0	0
Ndiolofene	0	1	1	0	1	1	0	1	1	0	1
Ngar Dia	0	1	1	0	1	0	0	1	1	0	0
Ngar Keur Amady Yacine	1	1	1	1	1	1	1	0	0	1	0
Ngueyene Mamady	0	0	0	0	1	1	0	1	1	0	1
Sam Gowethie	0	1	1	0	1	1	1	1	1	0	1
Samaco Toucouleur	0	0	0	1	1	1	1	1	1	0	1
Soukhoupe	0	1	1	0	1	1	1	1	1	0	1
Tene Fode	0	1	1	1	1	1	1	1	1	0	1
Thiangane	0	1	1	0	1	1	0	1	1	0	1
Thila garang	1	0	0	1	1	1	1	0	0	1	0
Thimène Diago	0	0	0	1	1	1	1	1	1	0	0
Thiwalo Ndiouffene	0	0	0	0	1	1	1	1	1	0	0

Having established the dataset, I will first analyze the necessity of conditions and selected combinations of conditions, before I analyze sufficiency in the next subsection.

3.4.2. Analyzing necessity: configurations as preconditions of the outcome

Identifying necessity is not the actual test of program theory, but it helps to discuss the causal relations within the data diversity. Two major indicators for necessity are analyzed: consistency, also defined as inclusion[28], and coverage (Ragin 2006). As stated before, the consistency score

---

[28] Ragin (2006) defines the two indicators as consistency and coverage while the QCA package in R uses the wording inclusion and coverage, see Thiem and Duşa (2013, 33).

displays the percentage of cases in which the hypothesis of necessity is true: the configuration has been present when the positive outcome has been present, too. The coverage rate provides information on how many of the total number of cases are explained by a selected configuration. Within the deterministic approach of QCA, a necessary configuration has to have a score of 100% for both indicators. In the case of a possibilistic approach, lower consistency scores are allowed. For combinations of conditions, a theoretical backing has to be provided to permit a meaningful analysis (Wagemann and Schneider 2007, 58-59). For this aim, I will first analyze single conditions followed by combinations of conditions which are of interest with regard to the program theory. As the scores are calculated independently of any combination of conditions, it is possible to discuss all scores for the conditions of both program theories at once.

When I apply the thresholds for a deterministic solution, 100% consistency and 100% coverage, none of the conditions are necessary for the outcome. But setting lower values for consistency and coverage scores provides a table with 50 configurations having at least a consistency score (incl) of 90% [29] and a coverage rate (cov.r) of more than 50%. Thus, the conditions remain highly consistent with the hypothesis to be necessary for the outcome and they cover at least half of the cases with a positive outcome which have to be explained.

Table 3-2: Consistency and coverage for necessary configurations – csQCA.

```
                          incl    PRI    cov.r
   -----------------------------------------------
 1  cov_planned           0.938  0.938  0.682
 2  POPULATION            0.938  0.938  0.682
 3  PUBLIGHT              0.938  0.938  0.682
 4  SOCIAL                0.938  0.938  0.556
 5  tech                  0.938  0.938  0.652
```

Note: Conditions coded 0, absent, are displayed in small letters, present conditions, coded 1, are displayed in capital letters.

Table 3-2 shows the first five rows of the output table to present the partially necessary individual conditions. Writing the conditions in capital letters represents their presence (1), while its absence (0) is indicated in small letters. I find five single conditions with high consistency scores of 93.8%, but all of them have coverage rates below 70%. These cases explain only a limited amount of the cases which they are supposed to explain. Nevertheless we can say that if the outcome is positive, in 93% of the cases the necessity hypothesis holds that the population is below the set threshold of 485.5 (1), public lighting is installed (1), social institutions are electrified (1), the planned coverage

---

[29] See Wagemann and Schneider (2007) for a discussion on this threshold.

is above the threshold of 71.5% (0) and the technology applied is SHS (0). The actual meaning of these possibilistic results is debatable. For example, for technology (SHS or hybrid) there are only six hybrid systems with just one case of a positive outcome for this technology. Thus, due to the limited positive outcome for hybrid systems, the positive outcome can be linked to the SHS technology in matters of necessity. The presence of the hybrid system leads to a positive outcome in 16.7% of cases electrified with this technology, and the presence of the SHS in 65.2% of the cases when electrified with SHS. This shows partial necessity and provides helpful information for the importance of this single condition. This reasoning can be applied similarly to the other conditions: they are partially necessary, but especially because their coverage rate is not very high, their presence should be noted, but not overemphasized as clearly necessary conditions.

With regard to combinations of configurations, only one of the theory based configurations reaches the consistency threshold of 100% for a clearly necessary condition. This is the configuration SCHOOL*HEALTH indicating the presence of a school and the presence of a health post. In 57% of the cases, this configuration is necessary. Thus, the actual existence of such social institutions seems to have the dissemination effect postulated by the theoretical discussion in the previous section. Despite the 100% consistency, the 57% coverage score indicates that this necessity hypothesis only holds for a limited number of cases. Thus, the hypothesis that dissemination through these institutions plays a crucial role can be found, but this test of QCA shows an empirical relevance that is limited to only 57% of the cases, for the remaining cases the impact is undefined.

Analyzing necessity provides us with a theoretical argument for the effect of the existence of social institutions (school and health post) for a limited number of cases. For the remaining partly necessary conditions it allows us to note that some conditions are partially necessary but limited by their coverage. These relations have to be included in the interpretation of the results.

3.4.3. Analyzing sufficiency: creating and minimizing the truth table

Comparable to the deterministic and the possibilistic analysis for necessity, there are two approaches for analyzing sufficiency: the deterministic truth table analysis and again the scores for consistency and coverage as a possibilistic extension of the analysis. The former is more in line with the idea of testing a program theory as the complexity of configurations is step-wise reduced top to bottom. For this purpose, the procedure starts with the presence of all configurations available in the data. They are then tested for contradictions and logically minimized to a simplified

solution. This solution includes all sufficient configurations with the relevant conditions. QCA as a qualitative technique applies the truth table analysis first. The consistency and coverage scores, subsequently, add additional information to the analysis (Wagemann and Schneider 2007, 98-101).

On the basis of the constructed dataset that displays all cases with the values of the conditions and the outcome, the truth table can be constructed. Table 3-3 displays the truth table for the conditions of the simple program theory.

Table 3-3: Truth table for basic program theory.

tech	op	produse	social	NCase	freq1	freq0	OUT
1	0	0	0	1	1	0	1
1	0	1	0	1	0	1	0
0	0	0	1	7	4	3	C
0	1	0	1	11	7	4	C
0	0	1	1	3	2	1	C
1	0	1	1	2	0	2	0
0	1	1	1	2	2	0	1
1	1	1	1	2	0	2	0

The first four columns of the table show the four conditions of the basic program theory. The fifth column, NCase, shows the number of observed cases for each configuration. The columns freq1 and freq0 show the number of cases which lead to the presence (freq1) or absence (freq0) of the outcome. This presence/absence dichotomy of the outcome is combined in the last column which displays the outcome value. The column shows three different values: 1, 0, and C. Configurations where all cases have a positive outcome have the value 1 and those with a negative outcome have a 0. C represents logical contradictions within a configuration. For example in row 3, we have four cases which lead to a successful project and three which do not. How to deal with this contradiction will be discussed later in this paragraph. Configurations that are possible, but which are not observed in the data, are called logical remainders. I do not include these configurations in this truth table as I do not use them in the analysis. Though it may be possible to make assumptions about non-observed cases, these assumptions must be strongly supported by proven theoretical or empirical evidence. Ragin and Sonnett (2005) call these logical remainders easy counterfactuals. However, at this point the theoretical implications are not sufficiently clear as I want to identify sufficient conditions to prove the program theories without having explicitly proven linkages yet. Hence, logical remainders are excluded.

The truth table for the simple program theory shows that the 29 cases have eight different configurations. Two configurations with three observed cases lead to a positive outcome and three with five cases lead to a negative outcome. More than 70% of the cases (21) are logical contradictions. Of course, at best the truth table would only consist of one combination of conditions that encompasses all observed cases and with each case leading to the same outcome. Yet, I observe contradictions in the truth table. To minimize these logical inconsistencies, the logical structure of the causal conditions has to be elaborated further (Ragin and Amoroso 2011, 150-51). This process is an iterative process which can be defined as a "dialogue between ideas and evidence" (Ragin and Amoroso 2011, 145).

Table 3-4: Eight strategies to resolve contradictory configurations

1	Add some condition(s) to the model
2	Remove one or more condition(s) from the model and replace it/them by (an)other condition(s)
3	Reexamine the way in which the various conditions included in the model are operationalized
4	Reconsider the outcome variable itself
5	Reexamine, in a more qualitative and "thick" way, the cases involved in each specific contradictory configuration
6	Reconsider whether all cases are indeed part of the same population
7	Recode all contradictory configurations as [0] on the outcome value (suggested by Ragin (1987))
8	Use frequency criteria to "orientate" the outcome.

Note: This table is a condensed version of Box 3.6 in Rihoux and de Meur (2009, pp. 48-49).

The literature suggests eight strategies on how to resolve contradictory configurations instead of simply erasing them, see table Table 3-4 (Rihoux and de Meur 2009, 48-49). On the one hand, the amendment of the truth table by adding information is helpful to resolve contradictions. On the other hand it is problematic as each new variable adds diversity to the solution. I use the advanced program theory with its additional conditions to add information to the truth table. Through stepwise inclusion of theoretically valid conditions and the analysis of their effect on the contradicting configuration, the iterative process also requires an analysis of correlations of the

conditions of the basic program theory and the newly included conditions of the more advanced program theory. Therefore, the conditions of the amended truth table are not equal to the conditions of the more complex program theory. For example, the condition geographic context is coded in the exact same way as the condition operator. Thus, it provides information on the development status and also on the operator. As their presence/absence values are equal, one variable is sufficient to cover the effect. If these conditions are sufficient, the causal relation has to be discussed in an extra case study to identify whether the positive outcome results from the state of development or the type of operator. The same problem arises for the conditions planned coverage rate, population and public lighting. If the coverage rate is low, the population is high and public lighting is also high. Thus, the logic behind these conditions points in the same direction. The planned coverage rate and the population can be logically linked: a higher population implies a lower coverage rate as it requires the same effort to electrify 100 households in different villages. But depending on the size of the population this results in different coverage rates. The common ground for the installed public lighting and the larger population can be found in the existence and frequent use of village centers. It makes more sense to install public lighting, when public space exists and is used more often.

After following all content-specific strategies of resolving contradictions, the number of contradictions reduces substantially. However, four contradicting configurations remain for thirteen cases.[30] Apart from the contradictions there are five configurations with eight observed cases with a positive outcome and six configurations with again eight observed cases with a negative outcome. Table 3-5 shows the amended truth table.

---

[30] Strategy 4, the operationalization check, will be discussed with further elaborations of QCA in the following section. Strategy 5, reconsidering the outcome variable, is part of the robustness check but by itself the outcome is transparently set by theory and data availability and is clearly the best outcome measure for the performance of the electrification program.

Table 3-5: Truth table for the advanced program theory.

geo	tech	produse	social	school	health	cov_planned	NCase	freq1	freq0	OUT
1	0	0	1	0	0	0	1	0	1	0
0	0	0	1	1	0	0	3	2	1	C
1	0	0	1	1	0	0	4	4	0	1
0	0	1	1	1	0	0	1	1	0	1
0	0	0	1	0	1	0	1	0	1	0
1	0	1	1	0	1	0	1	1	0	1
0	0	0	1	1	1	0	3	2	1	C
1	0	0	1	1	1	0	5	3	2	C
0	0	1	1	1	1	0	2	1	1	C
1	0	1	1	1	1	0	1	1	0	1
0	1	0	0	0	1	1	1	1	0	1
0	1	1	0	1	1	1	1	0	1	0
1	0	0	1	1	1	1	1	0	1	0
0	1	1	1	1	1	1	1	0	1	0
1	1	1	1	1	1	1	3	0	3	0

Still, the contradictions represent almost half the cases. Further, the diversity of cases has increased as configurations increased from eight to fifteen. To resolve these persistent contradictions, the more technical strategies seven and eight remain. Both strategies require recoding of the contradictions. Strategy 7 requests a manual recoding of all contradictions to negative cases, so all these cases have the value 0 for the outcome. This value is assigned because information on the cases is ambiguous and should therefore be used with caution. Strategy eight proposes using the frequency information to apply majority voting. The literature gives no preference of one strategy over the other. For example, Ragin (1987) postulates that unclear conditions cannot be coded as relevant and he accepts fewer informative configurations with a positive outcome. Ledermann (2012) applies majority voting and Emmenegger (2011) differentiates through theoretical deduction. Hence, the decision should be justified on "empirical grounds […] and/or on theoretical grounds" (Rihoux and de Meur 2009, 49).

However, for the present situation, there seems to be no clear solution. As I do not want to arbitrarily choose one strategy, I use both strategies and discuss the respective results in the following. In the present situation, majority voting leads to a positive outcome for all contradicting configurations and, logically, for the opposing strategy seven all contradicting configurations are recoded to have a negative outcome.

With the analytical frame established, the truth table can be simplified by Boolean minimization: "If two Boolean expressions differ in only one causal condition yet produce the same outcome, then the causal conditions that distinguishes the two expressions can be considered irrelevant and can be

removed to create a simpler, combined expression" (Ragin 1987, 93). This process allows for testing program theory as the minimized expressions represent the sufficient configurations for the outcome. These remaining configurations should ideally be equal to the program theory. It is also possible that one or more conditions of the theory are found to be sufficient conditions to prove the theory at least partly right. Minimizing the truth table for the positive outcome and recoding contradictions as either positive or negative leads to the solutions displayed in Table 3-6 and Table 3-7.

Table 3-6: Sufficient configurations – contradictions included.

Sufficient configurations – contradictions included (recoded positive)		
Minimization: Sufficient configurations for outcome (1), contradictions □ positive (21 cases)	Coverage	
	raw	unique
(1) geo *tech*SOCIAL*SCHOOL*cov_planned	37.5%	12.5%
(2) tech*produse*SOCIAL*SCHOOL* cov_planned	68.75%	43.85%
(3) GEO *tech*PRODUSE* SOCIAL*HEALTH*cov_planned	12.5%	12.5%
(4) geo *TECH*produse*social* school*HEALTH*COV_PLANNED	6.25%	6.25%

Note: The symbol "*" stands for the logical AND and the logical OR is represented by "+". Conditions coded 0, absent, are displayed in small letters, present conditions, coded 1, are displayed in capital letters.

Table 3-7: Sufficient configurations – contradictions excluded.

Sufficient configurations – contradictions excluded (recoded negative)		
Minimization: Sufficient configurations for outcome (1), contradictions □ **negative** (8 cases)	Coverage	
	raw	unique
(1) GEO *tech*produse*SOCIAL*SCHOOL*health*cov_planned	25%	25%
(2) geo *tech*PRODUSE*SOCIAL*SCHOOL* health*cov_planned	6.25%	6.25%
(3) GEO *tech*PRODUSE*SOCIAL*HEALTH*cov_planned	12.5%	12.5%
(4) geo *TECH*produse*social*school* HEALTH*COV_PLANNED	6.25%	6.25%

Note: The symbol "*" stands for the logical AND and the logical OR is represented by "+". Conditions coded 0, absent, are displayed in small letters, present conditions, coded 1, are displayed in capital letters.

The first table shows the result of the minimization with contradictions recoded to configurations with a positive outcome value, thus they are included in the analysis for sufficient conditions for the project's success. The analysis includes nine configurations with a total of 21 cases leading to a positive outcome. These configurations can be minimized to four final expressions that show the sufficient configurations, consisting of five to seven conditions, for a positive outcome. For the negative contradictions, the results are displayed in the second table. In this analysis the contradictions are recoded as cases with a negative outcome. When analyzing the sufficiency for the positive outcome, they are excluded. Again, a number of four final expressions can be derived. This is the result of a minimization of the five configurations with eight cases previously consistent with

61

the result of a positive outcome. The number of conditions per configuration ranges from six to seven.

When analyzing the truth table, frequency has to be taken into account. There are two measures for this coverage, the raw coverage and the unique coverage. The raw coverage indicates in how many cases a selected configuration leads to a positive outcome compared with all cases with a positive outcome. Often cases are covered by more than one configuration. Therefore, the unique coverage indicates how many of the cases with a positive outcome are explained only by one selected configuration (Wagemann and Schneider 2007, 135).

For the truth table analysis with included contradictions, the four different configurations show very different coverage rates. The first configuration explains six cases of a total of sixteen cases with a positive outcome (37.5%). Uniquely, it explains two cases (12.5%). The second configuration has the highest coverage score (68.75%). The configurations three and four are sufficient, but cover only two cases and one case, respectively. When the contradictions are excluded, the coverage scores decrease because half of the cases with a positive outcome (eight cases) are no longer included. This leads to low coverage rates of 6.25% to 25%: one to four cases covered by the solution. The solution coverage – the proportion of cases covered by all terms – is 100% for the case of positive recoded contradictions, as all positive outcomes are included. In the case of negative recoded, excluded contradictions, the solution coverage decreases to 50%, as eight cases are not considered in the analysis.

In addition to the results of this truth table analysis and before the interpretation of the results, we will discuss the additional information derived by calculating consistency and coverage scores for sufficiency which are displayed in Table 3-8. As previously discussed, the sufficiency analysis is more of a bottom-up approach. It allows us to analyze each condition individually and only if theoretical backing exists, combinations are analyzed (Wagemann and Schneider 2007, 50-63). Consistency scores have to be as close to 100% as possible. A score of 0.75 is the minimum value to argue for any partial sufficiency of the configuration (Ragin 2006, 3). On the one hand, when compared to the truth table analysis, this possibilistic approach has the advantage of the possibility to include contradicting configurations without the necessity of recoding. On the other hand, this bottom-up analysis only provides information on single conditions. This makes it possible to determine the effect of individual conditions. But program theory is understood as a package of

conditions that, taken together, results in the outcome. Thus, this information can only be an addition when testing program theory as it provides some hints of sufficient conditions. For the conditions of the basic program theory and also for conditions derived from the advanced program theory with four conditions, we find none with a consistency value of 75% or above. After this presentation of the results, I will interpret the findings of the sufficiency analysis in the following section.

Table 3-8: Consistency and coverage for sufficient configurations – csQCA.

```
                          incl    PRI    cov.r
------------------------------------------------
1  health                 0.778   0.778  0.438
2  PRODUSE*cov_planned     0.800   0.800  0.250
3  tech*PRODUSE            0.800   0.800  0.250
4  GEO*cov_planned         0.750   0.750  0.562
------------------------------------------------
```

Note: The symbol "*" stands for the logical AND and the logical OR is represented by "+". Conditions coded 0, absent, are displayed in small letters, present conditions, coded 1, are displayed in capital letters.

3.4.4. Interpreting results

First, I will discuss the results of the truth table analysis with regard to the underlying program theories. Afterwards, I will discuss the patterns of diversity identified in the truth table analysis considering the necessity and sufficiency scores as well as the truth table analysis for the negative outcome.[31]

The result of this csQCA is that I cannot prove the hypothesis formulated as program theories in section 2 – neither the basic nor the advanced theory. Within the data used based on these two program theories, QCA allows a transparent research process of causal relations. The sufficient configurations which are identified as results of the truth table minimization are not consistent with the configurations representing the program theories. This leads me to question the causal paths outlined in these theories. A robustness check with an outcome below 100%, for example coding the outcome "present" or "1" if 90% of the planned coverage rate is achieved, does not provide further solutions to this interpretation. Neither does including further conditions or excluding single or a group of conditions. Thus, the established program theories are falsified for this case study.

---

[31] The table with the solutions for the minimization of the truth table for the negative outcome can be found in the appendix 3.6.3 as Table 3-16.

There seems to be a much more diverse causal relationship than proposed in the project theory which requests further discussion of the resulting patterns of diversity. I begin the discussion with the most conservative approach, the truth table analysis with excluded contradictions (Table 3-7: Sufficient configurations – contradictions excluded.). This table displays eight cases which show four configurations with six to seven conditions. The solution with the highest coverage is configuration (1). In this configuration, the technology condition indicates which rural electrification technology can be connected to a positive outcome: SHS. The absence/presence dichotomies of the variables GEO, SCHOOL and SOCIAL are in line with what the program theories imply: They are present in the configuration which is sufficient for the presence of the outcome. But the absence of produse, health and cov_planned are contrary to the theoretical implications.

The same is true for the remaining configurations: the theoretical implications for a coherent program theory are only partly confirmed. The configuration with all conditions present (only tech could vary) is not identified as a solution. For the truth table analysis including contradictions, this diversity within the different sufficient solutions and the absence of the configuration presenting the program theory is persistent.

Thus, we cannot find the specific configurations – set in this study as the basic program theory or advanced program theory – in its completeness as a sufficient configuration for the project success. Nevertheless, the theories are partly reflected in the solutions. The conditions and their relation to the project success are therefore discussed further. For this purpose, I also include the necessity and sufficiency scores.

Discussion of individual conditions

The technology condition is mostly sufficient when the technology used is SHS. This can be explained by the higher costs or different planning expenses for hybrid systems. As there are numerous differences between these technologies, this solution has to be dealt with carefully. In comparison to the truth table analysis with a negative outcome, SHS keeps its prominent role within different configurations. This is highlighted by the consistency and coverage scores.[32] Furthermore, SHS has been found to be partially necessary for the outcome. Comparing the result to the

---

[32] When analyzing the consistency score for tech combined with other variables, in combination with productive use, it represents the only configuration that is partially sufficient.

sufficiency analysis for the negative outcome, we find the presence of the hybrid technology (TECH) as partially sufficient. Thus, SHS is an important, partially sufficient condition, which should be considered important for the project success.

For productive use, the analysis does not provide a clear result as the absence or presence is not logically connected within the configurations. Despite this unclear result, with regard to the consistency scores, productive use and the technology SHS form the only partially sufficient configuration. This partial sufficiency indicates a potential positive effect of productive use on the project's success when combined with SHS. Nevertheless, the role of productive use remains unclear.[33]

The electrification of social institutions is present in most cases when the outcome is present, but this condition's variation is very limited – in only 7% of the cases it has values different from 1. Only as necessary condition could this variable have a clear causal relation. This is due to the fact that its strong presence provides high consistency scores for sufficiency for the positive but also the negative outcome. In this case, only further analysis of a clear counterfactual without this electrification can help determining the role of the electrification of social institutions.

The conditions school and health are mostly present in the sufficient solution of the minimization process. Starting again with the most conservative approach, the first configuration shows that the presence of the condition school serves the dissemination sufficiently. This finding, at least one of these conditions is present in a sufficient configuration, is persistent throughout the remaining configurations. This is supported by the analysis with included contradictions (see Table 3-6). Comparable to the discussion of the social condition, the combination of school and health can be identified as an important part of sufficient solutions. But if combined to one condition, its combined variation is also very limited. Therefore, it is also prominently present when analyzing the sufficient configurations for the negative outcome. Again, it is not possible to clearly state if the condition is causally linked to the positive outcome.

For the planned electrification coverage the findings contradict the theoretical considerations. Sufficiency and necessity scores as well as the truth table analysis for a positive and a negative

---

[33] This unclear role is still typical for the introduction of productive use in development cooperation programs on renewable energy. Its effects are still under research in other projects of GIZ but are still defined as promising. See for example Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) (2013).

outcome show that a high planned coverage rate is positively related to the outcome. This contradiction is solved by relating these results to the applied technology: the planned coverage rate is correlated with technology for electrification. For SHS the planned coverage rates are higher and the villages are smaller, the population is therefore lower. Hence, the decision for SHS should be examined further as this decision could provide further information on conditions positively related to the outcome.

The geographical context variable appears in some parts of the sufficiency analysis. But with regard to the configurations with included contradictions, this variable can either be excluded or has no clear effect within the configurations. Thus, this variable – which includes also the condition operator – has no causal effect on the outcome.

The results of this interpretation require further analysis but also offer concrete results: the most important finding is that neither a simple nor a more advanced program theory can cover the causal complexity. This emphasizes the need to reconsider the program hypothesis in this study. Here, QCA shows that some conditions, such as the type of technology or the planned coverage rate, are major conditions within the complex sufficient solutions. A deeper and broader analysis of the potential cases and causes of successful electrification is needed. This could make it possible to find conditions which are explicitly related to either positive or negative outcomes. Though the results of the analysis are not as unambiguous as a project manager would hope for, this hands-on evaluation has proven that QCA is an accessible evaluation tool for programs and projects which allows one to quickly and transparently check existing program theories. Furthermore, through the "dialogue between ideas and evidence" (Ragin and Amoroso 2011, 145) and the examination of each configuration and condition, the researcher gains deep insight into the individual cases, their similarities and differences, and their interrelations with the outcome.

3.4.5. Further developments of QCA: mvQCA and fsQCA

mvQCA

Multi-value QCA (mvQCA) lifts to some extent the limits of csQCA by applying multi-value variables, i.e. ordinal or interval coding instead of dichotomous conditions.[34] For instance, in this

---

[34] The tables for the mvQCA can be found in the appendix 3.6.3, with the structure following the csQCA, so necessity and sufficiency scores for negative and positive contradictions can be found in Table 3-17, Table 3-18, Table 3-19, and Table

case study mvQCA allows for the condition electrification of social institutions following specifications: no (0), a part (1), or all (2) social institutions in an electrified village. Thereby, mvQCA decreases the risk of a loss of information due to simplification of the data distribution. In addition, dichotomization may lead to a large number of contradictory configurations which the researcher cannot solve through sensible construction of the analytical frame. As a dichotomous variable is the simplest multi-value variable, mvQCA is a generalization of csQCA (Cronqvist and Berg-Schlosser 2009, 69-72).

As a basic dataset for the mvQCA, I use the advanced truth table as analyzed in the previous section. Some conditions can only have one of two values (presence/absence) and do not change: geographical context, technology, productive use, school, and health. As described above, for the condition social, the information whether all social institutions in the village have been electrified is coded with the values zero, one, and two. For the interval scaled conditions, the procedure is similar to dichotomization. For the planned coverage rate, the clustering method used in the dichotomization process, the Ward's method, provides three main clusters. The thresholds are 58.5% and 71.5%. With regard to the data, these structural breaks are comprehensible. I can now use the condition population as the multi-value coding allows population and coverage rate to differ in their coding. The thresholds for population are 362 and 485. The outcome is still dichotomized as mvQCA does not allow a multi-value outcome. As above, I use mvQCA to test the underlying program theory by analyzing whether sufficient configurations identified in the truth table minimization are identical to the theoretical considerations of the program theory. The possibility to allow more diversified values of the conditions makes the identification process different to csQCA as more information can be included.

Analyzing necessity, I find that for a deterministic solution, none of the conditions but one configuration is necessary for the outcome. This is the presence of both school and health. The possibilistic analysis shows the same results as the csQCA.

With regard to the sufficiency analysis, the results are at least as diverse as the csQCA results. In comparison to the csQCA, however, the mvQCA truth table has only nine contradicting cases. For these cases, majority voting does not lead to a clear prediction for the recoding to a positive or negative outcome. Nevertheless, I code equal frequencies as positive when we come to majority

---

3-20. Subsequently, Table 3-21 shows the results of the truth table analysis and Table 3-22 and Table 3-23 provide the overview of the results for a positive and a negative outcome.

voting to allow again two minimization processes, one with included and one with excluded contradictions. The increase in information and thereby in diversity in this mvQCA does not lead to a clearer solution of the minimization process. For the sufficiency, consistency, and coverage scores, the result is similar. To sum up, mvQCA does not improve or facilitate the discussion of conditions, theoretical implications and their interpretation. In the next section, I use fsQCA to test if this most complex form of QCA provides clearer results.

fsQCA

Fuzzy-set QCA extends the dichotomies of csQCA or multi-values of mvQCA by permitting membership scores. These scores are in an interval between 0 and 1 and they allow assigning "more in than out" or "more out than in" membership scores (Ragin 2000, 154-55). Each condition is calibrated to define which value describes which relative membership compared to a maximum and minimum of the condition's values. For the values which are somehow "in the middle" of this membership, so which do not have the maximum or minimum value, a cross-over threshold is set. This threshold identifies these unclear membership scores as "more in than out" when above or "more out than in" when below this threshold. The actual membership scores can then be assigned manually (direct assignment) or in a more technical calibration process, which will be explained further below (Thiem and Duşa 2013: 57).

With regard to electrification of social institutions the three values "none of the institutions electrified", "partial" and "total electrification" can now be changed from independent 0, 1, 2 values to interrelated membership scores. In this case the membership score 0 is the minimum value. It represents the situation of no institution with electricity. The value 2 is the maximum value. It represents the maximum membership score which is set to 1. In between, there is the partial electrification. I will code this partial electrification manually closer to the membership score 1. This is due to theoretical considerations, because the dissemination effect can be assumed to be very strong at the beginning as it becomes already visible that electrification is in progress. Thus, I assign a membership score that is not equal to 0.5 which would be an indifferent membership score, that means neither in nor out. I set 0.75 because as one of two institutions electrified is closer to full membership by its effect than to the 0 membership. In this case, we apply a direct calibration of the scores with a five-value scheme for membership whereby 0.25 and 0.5 have no empirical evidence.

Besides this direct calibration, continuous fuzzy sets permit any values in the interval from 0 to 1, mostly in relation with indirect or transformational calibration (Ragin 2008, 94-97). For example, the outcome values are different percentages which are shown in the first plot in the upper left corner of Figure 3-1.
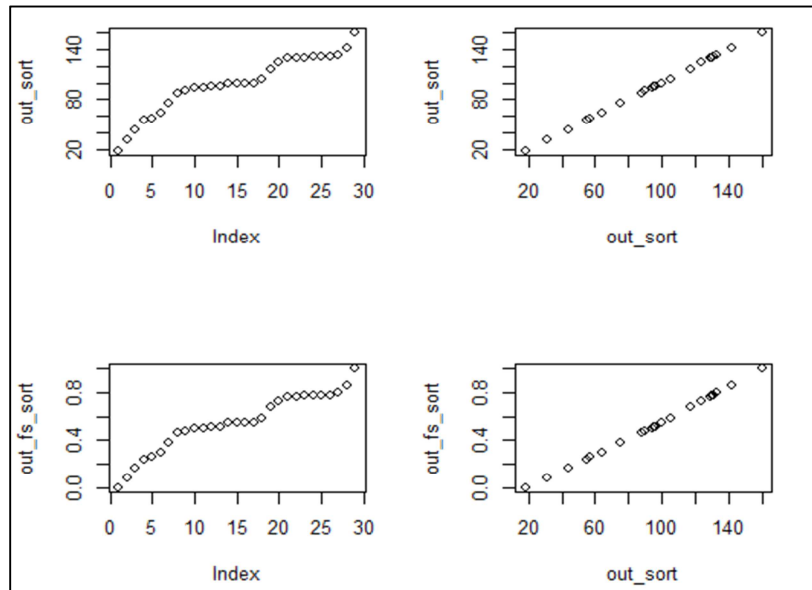
Figure 3-1: Calibration of the outcome variable – fsQCA.

It is possible to group these coverage rates into a low, medium low, medium high and high group. Plotting the sorted values of the outcome against each other in the second graph in the right upper corner provides more insights into this potential grouping. The minimum rate is 18%, the maximum rate is 160%. Now we have to set a crossover. This crossover threshold is generally hardest to define. In csQCA this threshold is 100%. Below 100% the project was not successful and the outcome was coded negative.[35] Thus, it can be defined as a little bit more in than out value for project success. Having set these three values, I apply a linear calibration, thus, I assign membership scores based on the linear distances to the previously set minimum, maximum and cross-over thresholds (Thiem and Duşa 2013, 57). This calibration results in membership scores between 0 and 1 which are displayed in the two graphs in the lower part of Figure 3-1. I find the structure of the data displayed above perfectly mirrored in the membership scores.

---

[35] For a robustness check, I changed this threshold as for example 94% seems more adequate as the project is still almost a success and the 94% value is clearly situated within the group of projects close to 100%. Neither did this change the diversity of the results in csQCA nor in fsQCA.

For the fsQCA, the new dataset consists of directly and indirectly calibrated values for the conditions: outcome, planned coverage rate, population, electrified social institutions and the existence of social institutions. The remaining variables have the membership scores 0 and 1 related to their dichotomous values (see the fsQCA data table in the appendix 3.6.3 - Table 3-24).

Table 3-9: Consistency and coverage for necessary conditions – fsQCA.

```
                             incl   PRI    cov.r
   ------------------------------------------------
1  SOCIAL_FS                 0.950  0.934  0.543
2  SCHOOL                    0.872  0.872  0.553
3  COV_FS                    0.898  0.662  0.712
4  tech                      0.859  0.859  0.592
```

Note: The symbol "*" stands for the logical AND and the logical OR is represented by "+". Conditions coded 0, absent, are displayed in small letters, present conditions, coded 1, are displayed in capital letters.

Following the general QCA process, I first analyze necessity. Table 3-9 displays the respective consistency and coverage scores.[36] The results show that none of the single conditions are absolutely necessary. With regard to partial necessity, most conditions already identified by the csQCA are again found. One additional condition is necessary, the presence of the condition school. But the coverage rate of 55% is not high. Hence, there is partial necessity but only for a limited amount of cases. For combinations of conditions, I expect the existence of productive use and the electrification of social institutions to be necessary. But their combined consistency score is not above the 90% threshold. No other theoretically implied effect of combined conditions can be found necessary – above the 90% threshold and with a satisfying coverage rate.

---

[36] Table 3-25 in the appendix 3.6.3 provides an overview for lower consistency and coverage scores.

Table 3-10: Truth table for fsQCA.

TECH	GEO	PRODUSE	COV_FS	POP_FS	SCHOOL	HEALTH	SOCIAL_FS	OUT	n	incl	PRI
0	1	1	1	0	1	1	1	1	1	1.000	1.000
1	0	0	0	1	0	1	0	1	1	1.000	1.000
0	1	1	1	0	0	1	1	1	1	0.983	0.976
0	0	0	1	0	1	0	1	1	3	0.956	0.932
0	0	1	1	1	1	1	1	1	1	0.954	0.000
0	0	1	1	0	1	1	1	1	1	0.933	0.689
0	0	0	1	0	1	1	1	1	3	0.887	0.772
0	0	1	1	0	1	0	1	1	1	0.841	0.469
0	1	0	1	0	1	0	1	1	4	0.824	0.631
0	1	0	1	0	1	1	1	1	5	0.768	0.583
0	0	0	1	0	0	1	1	0	1	0.539	0.000
0	1	0	0	1	1	1	1	0	1	0.489	0.000
1	1	1	0	1	1	1	1	0	3	0.392	0.000
1	0	1	0	1	1	1	1	0	2	0.355	0.000
0	1	0	1	0	0	0	1	0	1	0.104	0.000

The truth table for the fsQCA is shown by Table 3-10. This truth table displays a 1 for all values of the conditions which are above the crossover threshold of 0.5 and 0 if the value of the condition is below. The consistency score (incl) describes the consistency of the configuration in this row. The adequate threshold from the literature for a consistency score is 75%. I use a threshold value of 76.8% as the next configuration's score is almost below the threshold for a clearly negative outcome. The outcome value which describes project success is changed in the truth table. Here the relation to a positive outcome is already described by the consistency score. For example, a score of 76.8% shows that this configuration is consistent with the sufficiency hypothesis for a positive outcome in 76.8% of its presence. By the previously set threshold of 76.8%, I define this score as the minimum consistency for a configuration to be related to a positive outcome. This relation is now described by the outcome value in the fsQCA truth table. Its value means that this configuration is a consistently sufficient configuration for the outcome (Wagemann and Schneider 2007, 222-23).

For the resulting 21 cases included in ten configurations, Table 3-11 presents the results from the minimization procedure. We have five configurations with six to eight conditions. With regard to consistency, configuration 4 has to be examined further. This configuration represents only one case and it has a very low consistency of 58.5%. Especially due to this low consistency score, we can exclude this solution as an outlier. For the remaining solutions, the unique coverage rates differ substantially. While configuration 1, 3 and 5 represent a very small amount of cases, solution 2

represents 32% of the cases. Therefore, we will have a closer look at this solution. Most conditions confirm their theoretically assumed or previously found effects: technology SHS, school, a low coverage rate, high population and the electrification of social institutions are present in the sufficient configurations.

Table 3-11: Sufficient configurations – fsQCA.

		incl	PRI	cov.r	cov.u
1	tech*geo*COV_FS*pop_fs*SCHOOL*SOCIAL_FS	0.914	0.817	0.335	0.034
2	tech*produse*COV_FS*pop_fs*SCHOOL*SOCIAL_FS	0.841	0.706	0.564	0.329
3	tech*GEO*PRODUSE*COV_FS*pop_fs*HEALTH*SOCIAL_FS	0.990	0.984	0.085	0.085
4	tech*geo*PRODUSE*COV_FS*SCHOOL*HEALTH*SOCIAL_FS	0.585	0.178	0.068	0.003
5	TECH*geo*produse*cov_fs*POP_FS*school*HEALTH*social_fs	1.000	1.000	0.048	0.048

Note: The symbol "*" stands for the logical AND and the logical OR is represented by "+". Conditions coded 0, absent, are displayed in small letters, present conditions, coded 1, are displayed in capital letters.

The interpretation of the fsQCA leads to the same result found for csQCA and mvQCA: the hypothesis for the specific configurations forming the program theories in this study are not confirmed by the observed cases. Nevertheless, necessity scores and more detailed analysis of the minimization solutions permit one to identify individual conditions partially important for the project success.

3.5. Conclusion – QCA as a valuable tool to test program theory

The objective of this paper has been to test QCA as a means of evaluating program theory for development cooperation projects. I find QCA to be a very accessible and transparent tool to test program theory, while keeping in mind the typical difficulties of using a program theory or theory of change to describe the functioning of a program and thereby a real-life situation.

For the case study on electrification of villages through renewable energies in Senegal, I can falsify the developed program theories. It is possible to show different possibilities for potential program theories and its components in the later discussion. In this regard, QCA is strong in testing program theory. But I am not able to identify a clearly sufficient solution which allows creating a new, better fitting program theory. This is due to data and time constraints. For an ex-post analysis, these constraints are set, but with regard to potential up-scaling or continuation of a program, the iterative process of QCA holds the potential to review and retest the program theories' components and achieve clearer results for one or a multitude of program theories.

With regard to the different methods of QCA, this testing of program theory can be based on csQCA. The additional information in mvQCA and the fsQCA did not provide better results for practical use. In different settings, mvQCA can be a promising further development. But in general, the possibility of dichotomization should be carefully considered before applying mvQCA as the diversity in the data increases strongly. The fsQCA approach is very much in line with the advancements of technical applications. Nevertheless, the results in this case study do not reveal better results. Therefore, conducting a quick csQCA should be a prerequisite to fsQCA to consider the potential gain of information with a more complex fsQCA. Moreover, the gain of information has to be carefully balanced with the transparent and accessible process of the analysis. In this context, fsQCA inherits the risk to be a black box for the addressee of the evaluation.

QCA is also promising for discussing single conditions or advancing theory, but in this case study, the diversity was so high that the results were very limited. The in-depth analysis points out individual conditions as promising for further research but I cannot clearly identify any of the conditions as clearly necessary or sufficient for the project's success. This is due to the fact that QCA is a static evaluation instrument which allows testing a program theory at a specific point in time – currently there is further work on this issue on including time into QCA. In addition to QCA,

the econometric analysis with an OLS regression is a valuable tool that can be applied together with QCA, especially when discussing individual conditions – see appendix 3.6.2. With regard to the comparison of the more quantitative econometric analysis, QCA provides the same results. Furthermore, it is replicable as its rules are in a format determined by the use of Boolean algebra and a given theory which translates the rules of logic into the QCA framework.

In conclusion, I recommend csQCA for practical application in testing program theory of development cooperation projects. QCA should be used to assess formulated simple program theories, especially when the logical framework is supposed to serve as a basis for scaling up or replicating projects. Nevertheless, QCA has to be part of a broader evaluation approach. For example, in the pragmatic approach of evaluation by GIZ (Dinges and Schweitzer 2013) QCA fits into the testing of a formulated program theory and the discussion of chosen indicators.

Subsequent to this work, further analysis could be the practical integration of QCA in a method mix and the discussion on which methods complement each other in such an approach. In addition, the value of QCA's "easy-to-grasp" results could be analyzed to further discuss its applicability. For theory, QCA is based within realistic and theory-based evaluation. Especially the suitability of QCA and more complex program theories or theories of change with regard to time or two-step analysis is still a pending question in QCA research.

3.6. Appendix to essay 2

3.6.1. A detailed introduction to QCA

Comparative methods such as QCA were first used in natural science in the 18th and 19th century, e.g. by Linnaeus (1753) or Cuvier (1812). The logical foundations date back to Hume (1758) and Mill (1843). In the 1980s and early 1990s, QCA was first developed and applied in political science and historical sociology to analyze causal relations at the macro-level. Today, QCA is also applied at the meso-level, to analyze social networks or collective actors, and at the micro-level, to analyze inter alia small groups and individuals (Berg-Schlosser et al. 2009, 1-4).

As a comparative method, QCA combines qualitative and quantitative approaches. Ragin (1987, 84) speaks of QCA as integrating "the best features of the case-oriented [qualitative] approach with the best features of the variable-oriented [quantitative] approach". The comparative method searches for patterns of diversity within the different cases, thus, multiple causal relations that lead to the same outcome (Ragin and Amoroso 2011, 161; Berg-Schlosser et al. 2009, 4). In social science, causation is often multiple and conjunctural, thus different combinations of circumstances lead to the same result. In this context, QCA solves simple paradoxes such as "[cases] A and B are different. Yet both experience outcome Y. What causally relevant similarities between A and B explain this common outcome?" (Ragin 1987, 33-45).

Table 3-12: Example of a truth table.

Cases	Condition 1	Condition 2	Number of cases	Outcome
Case A	Present (1)	Absent (0)	1	Present (1)
Case B	Present (1)	Present (1)	1	Present (1)

I use this example by Ragin to explain the main process of QCA, the construction and analysis of a truth table. Table 3-12 shows such a table for two cases, case A and case B, with two conditions 1 and 2. The conditions were identified by theoretical considerations of the potential causal relations

between certain elements of the cases, the conditions, and a definite outcome. In crisp-set QCA, these conditions are either present or absent, mostly indicated by 1 and 0 respectively. The outcome is also either present or absent. In QCA, each row in such a table does not represent a single case, but a configuration. Such a configuration is a specific combination of condition values and the outcome. There are only two cases with two different configurations which are indicated in the column "number of cases". If there are two cases with the same configuration, they are displayed in one row. Thus, if we had 100 cases with two configurations, the table would not change but for the number of cases indicated. Thus, it is not the individual case that is analyzed by QCA, but the different configurations leading to an outcome. This is what the truth table displays: the different configurations, the number of cases in each configuration and the respective outcome value (Rihoux and Ragin 2009, xix). The outcome value has to be assessed separately to the configuration because it is possible that the same configuration leads to different outcomes. Then the cases with the same combination of conditions are logically contradictory with regard to the outcome value. There are several strategies to deal with these contradictions. For example, there is the inclusion of a new condition, which is thereby identified as crucial for the analysis. All contradictions need to be resolved to have a completely consistent truth table. If this is not possible, there are technical solutions, for example the exclusion of all contradicting cases, as their causal effect is not unambiguous. [37]

Once all configurations can be displayed in the truth table, QCA applies Boolean logic to identify the conditions which are causally relevant for the positive outcome. The results of a QCA are replicable as its rules are in a format determined by the use of Boolean algebra and a given theory which translates the rules of logic into the QCA framework. This replicability contributes to the scientific character of the approach (Berg-Schlosser et al. 2009, 8-14; Cronqvist 2007, 20).

This Boolean minimization consists of the following logic: if two configurations with the same outcome differ in only one condition, this condition is irrelevant when identifying the key conditions leading to the outcome. In the example, we find that in both configurations the outcome is present, but the configurations are not similar. They differ in condition 2. Accordingly, condition

---

[37] The eight strategies include 6 which are content specific: 1. Adding conditions; 2. Removal of conditions; 3. Replacement of conditions; 4. Operationalization check; 5. Outcome variable check; 6. Case selection criteria check. Two further strategies are technical strategies: 7. Recoding of all contradictory cases to 0; 8. Majority voting, applying frequency criteria Rihoux and de Meur (2009, 48-49).

2 is irrelevant and we find the presence of condition 1 as sufficient to describe the causally relevant configuration for a present or positive outcome.

This analysis is defined as truth table analysis or the minimization of the truth table. It identifies configurations which are sufficient for the presence of the outcome. Sufficiency means that when this configuration is present, the outcome is present, too. By definition, sufficiency does not imply that the outcome is only present when one selected configuration is present. Instead, sufficiency allows a solution with different configurations that are each sufficient for the outcome. Thus, with a truth table analysis QCA can identify a multitude of sufficient configurations for the outcome which is defined as multiple, conjunctural causation. This goes beyond simple additivity of conditions and emphasizes the role of combinations of conditions in explaining a specific outcome (Berg-Schlosser et al. 2009, 9). QCA weighs every case equally, so that single cases leading to a totally different path for the specific outcome are as important as a multitude of cases with the same configurations leading to the same outcome. This focus on cases reflects the aim of the method: analyzing diversity. Nevertheless, QCA works with the postulate of all social research that there are some causal regularities in social phenomena. Thus, it is important to incorporate frequency criteria when discussing and interpreting results. If some outliers strongly diversify the results, they have to be assessed individually. Thus, frequency has to be taken into account (Ragin 1987, 88).

Preparatory steps are crucial to conduct a QCA. The cases have to be identified and the outcome and the conditions have to be identified and discussed with regard to their causal relation. These steps of the analysis are based on the research question and theoretical considerations found in case specific documents or more generally in the relevant literature. The outcome and the conditions are then coded, in csQCA dichotomized into present (1) or absent (0). This coding again involves the qualitative discussion and justification of this coding. A dataset is established by putting the cases into rows and the conditions and the outcome into columns. This dataset is then transformed into a truth table by displaying only different configurations in the rows, and not the cases anymore. Though conditions and their respective configurations are expressed ex-ante, the analytical framework is flexible and open to new results and thereby new causal conditions (Ragin and Amoroso 2011, 139-42). This openness interconnects the deductive process of placing a theoretical frame for the QCA and the inductive process of changing the settings due to findings of new "ingredients" (Berg-Schlosser et al. 2009, 6).

The truth table analysis is a top-down approach as it starts with the configurations present and minimizes them from this starting point. In addition to this top-down approach, a bottom-up approach adds further information to the truth table analysis. This bottom-up approach consists of analyzing the necessity of conditions or selected configurations and the sufficiency for single conditions or selected configurations.

First, necessity and sufficiency need to be defined. A condition is necessary if it needs to be present for the occurrence of the outcome. Thus necessity is a precondition of the outcome but does not always lead to the outcome (Ragin 1987, 99). As discussed before, the outcome always occurs in the presence of the sufficient conditions but can still be observed if the sufficient condition is not fulfilled. Hence, sufficient conditions are not obligatory for the outcome (Rihoux and Ragin 2009, xix).[38] Necessary conditions are identified in the given dataset by finding conditions which are always fulfilled when the outcome is also present. In Table 3-12, condition 1 is not only sufficient, but also necessary for the outcome. But if in a third configuration the outcome is absent when condition 1 is present, this condition cannot be necessary anymore. Table 3-13 displays such a case. A bottom-up sufficiency analysis is conducted similarly. The dataset is searched for sufficient conditions, thus conditions which are present when the outcome is present. In Table 3-13 condition 1 and 2 are both sufficient, as their presence is always connected to the present outcome. But if we focus on individual conditions, their absence is sufficient for the present outcome, too. This already shows that all values of the conditions are included in necessity and sufficiency analysis and that especially the outcome has to vary to allow for analyzing sufficiency. This analysis of necessity and sufficiency for single conditions can also be conducted for selected combinations of conditions. For example, the combination of the presence of conditions 1 and 2 is not necessary as it is not present for two other configurations. But this combination is sufficient for the outcome. Analyzing single conditions is straightforward when following the bottom-up approach but constructing combinations of conditions need a theoretical backing to allow a meaningful analysis (Wagemann and Schneider 2007, 58-59).

---

[38] Also see Goertz 2006a, 2006b), Goerts and Starr (2003) and Ragin (2000).

Table 3-13: Example of necessity and sufficiency in a truth table.

Cases	Condition 1	Condition 2	Number of cases	Outcome
Case A	Present (1)	Absent (0)	1	Present (1)
Case B	Present (1)	Present (1)	1	Present (1)
Case C, case D	Absent (0)	Present (1)	2	Present (1)

In general, this analysis of necessity and sufficiency is a deterministic analysis. It identifies conditions either as necessary or not. But it is also possible to calculate a possibilistic ratio to determine how necessary or sufficient a selected condition or configuration is. For csQCA and mvQCA this means the calculation of the simple proportion of consistent conditions or combinations of conditions. This ratio is the consistency score, also defined as inclusion[39] (Ragin 2006). For necessity, the consistency score displays the percentage in which the hypothesis of necessity is true, thus, the configuration is present when the positive outcome is also present.

The consistency score, here for necessity N, can be calculated as follows (Thiem and Duşa 2013, p.33):

$$Consistency_N(C) = \frac{\sum_{i=1}^{n} c_i = 1|o_i = 1}{\sum_{i=1}^{n} o_i = 1}$$

The numerator provides the number of cases which have the condition or configuration C equal to 1 under the precondition that the outcome O is also present, thus has the value 1. To calculate the score, this number of necessary cases is now divided through all cases with an outcome value of 1. In deterministic analysis, a necessary configuration has to have a score of 100%. But a lower consistency threshold can be used to then discuss highly necessary individual conditions or configurations. Possibilistic causal relations, thus partly necessary or partly sufficient configurations

---

[39] Ragin (2006) defines the two indicators as consistency and coverage while the QCA package in R uses the wording inclusion and coverage, see Thiem and Duşa (2013, 33).

need to be interpreted carefully. Nevertheless, they can provide further insights into the data structure (Wagemann and Schneider 2007, 58-59). A second score, the coverage rate allows to discuss whether the partly necessary configuration is trivial. The coverage rate shows how many cases of the total number of cases with the outcome value that has to be explained are covered by the necessary or the sufficient condition or configuration – thus it assesses the empirical relevance of a consistent subset (Ragin 2006).

The coverage rate, for necessity N, can be calculated as follows (Thiem and Duşa 2013, p.33):

$$Coverage_N(C) = \frac{\sum_{i=1}^{n} c_i = 1 | o_i = 1}{\sum_{i=1}^{n} c_i = 1}$$

Again, in the case of a deterministic analysis, this score has to be 100%. But it is possible to allow for a lower threshold. Coverage is only interpreted for consistent results as coverage for inconsistent results is not a meaningful indicator (Wagemann and Schneider 2007, 86-209).

Now, it is not only single conditions but also combinations of conditions that can be interesting for the necessity and sufficiency discussion. The inclusion and coverage scores are therefore increased to all combinations, in csQCA this is 3^k-1 combinations with k equal the number of conditions. In the example given in Table 3-13, we have eight possible combinations that can be tested. For this example, we find the consistency score and coverage rate which are displayed in Table 3-14 that displays all combinations for a threshold of 0.5 for the consistency score.

Table 3-14: Example for consistency and coverage

```
                                 incl    PRI     cov.r
    ---------------------------------------------------
1   CONDITION.2                  0.750   0.750   1.000
2   condition.1                  0.500   0.500   1.000
3   CONDITION.1                  0.500   0.500   1.000
4   condition.1*CONDITION.2      0.500   0.500   1.000
    ---------------------------------------------------
```

We see that the presence of condition 2 is necessary in three of four cases (0.75) of the cases with a coverage rate of 100%. In row 4 of the table we find a combination of two conditions that is also necessary, but only in 50% of the cases. For this example, these scores can be calculated by hand,

but for a larger number of conditions and potential combinations of them, applying computer software is useful.

Until now, I have discussed the truth table analysis and the consistency and coverage rates for necessity and sufficiency. The process of QCA always begins with the analysis of the necessary conditions. After discussing if one or more conditions or configurations are preconditions for the outcome, the next step, the truth table analysis, is conducted. Calculating the consistency and coverage rates for the conditions and selected configuration of interest can then provide further information for the interpretation of the truth table minimization.

This process is similar for all three approaches within QCA. The example with the dichotomized conditions represents a crisp-set QCA, the most common and most accessible QCA method. Lasse Cronqvist developed another method, the multi-value QCA, which is a further development of csQCA. MvQCA lifts to some extent the limits of csQCA by applying multi-value variables and allowing the use of ordinal or interval coding instead of dichotomous conditions. Thereby, mvQCA decreases the risk of information loss due to simplification of data distribution. In addition, dichotomization may lead to a large number of contradictory configurations that the researcher cannot solve through sensible construction of the analytical frame. As a dichotomous variable is the simplest multi-value variable, mvQCA can be seen as a generalization of csQCA (Cronqvist and Berg-Schlosser 2009, 69-72).[40] Today, besides the first software TOSMANA, inter alia the R packages QCA and QCA3 allow mvQCA analysis. The whole paper is based on the software R, but I checked the results with TOSMANA. Still multichotomies in mvQCA memberships are definite, now for more than the categories 0 and 1. Fuzzy-set QCA extends these memberships by permitting membership scores. These scores are typically in an interval between 0 and 1 and they allow assigning "more in than out" or "more out than in" membership scores (Ragin 2000, 154-55). Continuous fuzzy sets permit any values in the interval from 0 to 1, mostly in relation with indirect or transformational calibration (Ragin 2008, 94-97).[41] As this paper uses three different methods, the application is shown hands-on in the different sections. For the calculations and the

---

[40] For a more detailed introduction to mvQCA see Cronqvist (2006), Cronqvist (2007), Berg-Schlosser and Cronqvist (2011), and Thiem and Duşa (2013, 83-90).
[41] For a detailed introduction to fsQCA see Ragin (2000, 153 et seqq.) and Ragin and Rihoux (2009). For accessible introductions on setting the membership scores, defined as calibration, see Ragin (2008, 71 et seqq.) or Wagemann and Schneider (2007) and for some examples of practical applications see for example Emmenegger (2011). A detailed description on how to apply the software R for fuzzy sets can be found in Thiem and Duşa (2013, 51 et seqq.).

minimization process I use the software R with the packages QCA (Thiem and Duşa 2013) and QCA3 (Huang 2012) which allow me to conduct all three QCA approaches with one software.[42]

With regard to testing a program theory with QCA, Ragin and Rihoux (2009, 175) state that "the use of QCA for hypothesis-testing is not yet explored and bears a high potential as joint effects of conditions have not yet been widely exploited." Nevertheless, the process of QCA makes it possible to test a program theory. The process of establishing the dataset for QCA follows the research question which provides an outcome and conditions given in the program theory. Thereby, the truth table includes one configuration that represents the program theory. With the minimization of the truth table it is possible to identify whether the configuration given by the program theory is present. This will show that this program theory has empirical evidence. Then, the importance of this configuration is identified by assessing how many other configurations are present along with the program theory. Thus, the truth table analysis is a direct test of the existence and importance of a program theory. In addition to this test, necessity and sufficiency ratios can provide further details to discuss the results of this minimization process. This is especially important when the program theory or a nested sub-configuration cannot be identified as a sufficient configuration (Ledermann 2012). If the program theory cannot be identified, QCA can still be used to advance theory. This is possible by analyzing configurations or the sufficiency and necessity scores to establish a new single or multi-conjunctural theory for the program (Ragin and Amoroso 2011, 139-43).

To conclude, QCA allows one to verify a given theory by comparing the empirical results, i.e. existing configurations, with the theoretical hypotheses that specify causal combinations (Ragin 1987, 118). Cases can thereby be used selectively to illustrate or elaborate a certain theory. In the analysis of this paper, QCA is used to assess an explicit and an implicit program theory based on impact hypothesis for a rural electrification project in Senegal.

---

[42] Different software for QCA exist, but R is freely available and continually provides a multitude of further developments. An introduction to the different kinds of software can be found on COMPASSS (2013). For an introduction to the R packages, see Thiem and Duşa (2013).

3.6.2. Comparison with a quick and dirty econometric analysis

In the research literature, the use of QCA as a method is often compared to quantitative evaluation tools. This comparison focuses on regression analysis as the typical analysis to describe correlations of single, independent variables with a dependent output variable. In this section, I perform an Ordinary Least Squares (OLS) regression analysis in R to analyze the effect for each condition on the project outcome. On this basis, I discuss whether the regression analysis provides a better or only different analysis for evaluating program theory and this project specifically. QCA does not reveal any configuration previously defined by the program theories for this study. Only some selected conditions could be relevant for the positive outcome. First, this is tested by a regression for the positive outcome with the conditions included in both program theories as independent variables. Second, the individual effects for each condition are analyzed and, third, I use the step AIC approach to establish the model that fits the data best.

Table 3-15 displays the different OLS regressions. In model 1 and model 2, I apply a regression for the outcome as dependent variable and the conditions of the basic and the advanced program theory as independent variables, respectively. The results show that two conditions are significant at the 10% level, and the intercept is highly significant in the first, the basic model. The R-squared shows that the more advanced model 2 explains 37%, or for the basic model 21%, of the variation. The AIC and BIC provide qualitative measures to compare the models: the lower the value, the better the fit of the model. Interestingly, the basic model has lower values, thus, it is supposed to be the better fitting model. This is due to the fact that with more insignificant conditions added, the explanatory value of the model decreases. Thus, the variation of the conditions does not explain the variation of the outcome value. This is in line with the QCA findings.

To determine the individual effect for each condition, I conducted a regression analysis for each variable individually. Models 3a-c present three of these regressions. Model 3a analyses the planned coverage. It is significant at the 0.1% level. The coefficient provides the information that there is a positive correlation and if the planned coverage increases by 1 unit, the outcome value increases by 1.4 units. Interestingly, AIC and BIC point out that the model which includes only the planned coverage included is better than both models before with the larger number of conditions. Two other variables were prominent in QCA analysis, technology and electrification of social

institutions. They are present in model 3b and 3c. Only for technology can a significant effect be found – which disappears when including the variable coverage planned (see Model 2).[43]

Table 3-15: Regression table with the results for six OLS regressions.

	Model 1	Model 2	Model 3a	Model 3b	Model 3c	Model 4
(Intercept)	124.128***	-38.708	-10.628	105.217***	95.000***	-5.138
	(32.580)	(109.807)	(35.689)	(6.816)	(24.909)	(34.795)
data$op1	12.345					
	(13.033)					
data$tech1	-39.175 *	13.688		-31.384 **		
	(21.868)	(33.700)		(14.984)		
data$produse1	-4.597	-7.345				
	(16.002)	(17.240)				
data$social_cs1	-23.279	-41.956			4.000	-40.646
	(30.825)	(33.299)			(25.815)	(24.859)
data$geo1		-3.269				
		(13.331)				
data$school1		17.199				
		(19.140)				
data$health1		5.808				
		(14.657)				
data$pop2007		-0.007				
		(0.073)				
data$cov_planned		2.162 *	1.458 ***			1.889 ***
		(1.126)	(0.470)			(0.527)
R-squared	0.210	0.370	0.263	0.140	0.001	0.332
F	1.596	1.466	9.627	4.387	0.024	6.448
p	0.208	0.231	0.004	0.046	0.878	0.005
AIC	291.997	293.450	283.993	288.470	292.810	283.154
BIC	300.201	307.123	288.094	292.572	296.912	288.623
N	29	29	29	29	29	29

Note: The dependent variable, the outcome value, is on an interval scale as it displays the percentage rate of achieving the coverage rate which varies from 18% to 160%. The following conditions have dichotomous values: tech, produse, school, health geo. Three values have the condition social and interval scales for number of population and the coverage rate planned. The coefficients are displayed for each independent variable and, below, the term in brackets shows the standard error. The significance levels are displayed by stars: 0.01='***' 0.05='**' 0.1='*' 0.05. R-squared is the coefficient of determination, F is the F-test values, p is the p-test value for the F-test indicating the probability that the hypothesis is true, N is the number of observations.

Having discussed the significance of single conditions, model 4 is based on a concept which establishes a model that fits the data best. This approach is the stepAIC approach which performs a stepwise model selection by AIC (Venables and Ripley 2002).[44] Based on this indicator, the

---

[43] The individual regressions for each variable show that only population, the coverage rate planned and technology are significant at the 5% level.
[44] The AIC measures a model's quality, representing the contradicting effects of goodness of fit and complexity of the model – more independent variables which are at least partly relevant generally increase the goodness of fit but also increase the model complexity which is undesired. The AIC does not provide an absolute quality check as it only allows

independent variables are chosen. Model 4 has two independent variables, the electrification of social institutions, which is still not significant, and the planned coverage rate, which is still significant and therefore the most prominent result of this analysis.[45]

In conclusion, the regression analysis only focuses on the individual effects of each variable. Here, we find the planned coverage rate as the most significant independent variable and some hints for the technology SHS. But the variables electrification of social institution and school, which have been identified in QCA as partially necessary or sufficient, cannot be identified as significant.

---

comparing different models with each other. Therefore, the model constructed is the most relevant based on the independent variables we have, see Burnham and Anderson (1998).

[45] In addition, Table 3-26 presents regressions for individual conditions as the only independent variables.

3.6.3. Further tables and figures

Table 3-16: Minimization of the truth table and sufficiency score for negative outcome.

Minimization of the truth table – results with inclusion and exclusion of contradictions		
Minimization: Sufficient configurations for outcome (0), contradictions □ negative (21 cases)	**Coverage**	
	raw	**unique**
(1) geo*TECH*PRODUSE*SCHOOL*HEALTH*COV_PLANNED	15.4%	7.7%
(2) geo*tech*produse*SOCIAL*HEALTH*cov_planned +	15.4%	7.7%
(3) geo*tech*produse*SOCIAL*SCHOOL*cov_planned +	15.4%	7.7%
(4) GEO*tech*produse*SOCIAL*SCHOOL*HEALTH +	23.1 %	23.1 %
(5) geo*tech*SOCIAL*SCHOOL*HEALTH*cov_planned +	15.4%	7.7%
(6) TECH*PRODUSE*SOCIAL*SCHOOL*HEALTH*COV_PLANNED +	30.8%	23.1 %
(7) GEO*tech*produse*SOCIAL*school*health*cov_planned	7.7%	7.7%
Minimization: Sufficient configurations for outcome (0), contradictions □ positive (8 cases)	**Coverage**	
	raw	**unique**
(1) geo*TECH*PRODUSE*SCHOOL*HEALTH*COV_PLANNED +	15.4%	7.7%
(2) TECH*PRODUSE*SOCIAL*SCHOOL*HEALTH*COV_PLANNED +	30.8%	23.1 %
(3) geo*tech*produse*SOCIAL*school*HEALTH*cov_planned +	7.7%	7.7%
(4) GEO*tech*produse*SOCIAL*school*health*cov_planned +	7.7%	7.7%
(5) GEO*tech*produse*SOCIAL*SCHOOL*HEALTH*COV_PLANNED	7.7%	7.7%

Sufficiency scores for the negative outcome

```
                             incl   PRI    cov.r
---------------------------------------------------
1  COV_PLANNED              0.857  0.857  0.462
2  TECH                     0.833  0.833  0.385
3  produse*school*cov_planned 1.000 1.000  0.154
4  produse*SOCIAL*school    1.000  1.000  0.154
5  PRODUSE*SCHOOL*HEALTH    0.750  0.750  0.462
6  tech*produse*school      1.000  1.000  0.154
7  geo*PRODUSE*HEALTH       0.750  0.750  0.231
8  GEO*PRODUSE*SCHOOL       0.750  0.750  0.231
```

mvQCA: Tables for necessity and sufficiency scores and the truth tables analyses

Table 3-17: mvQCA - necessity scores, positive.

```
                                                          incl   PRI    cov.r
---------------------------------------------------------------------------
1   COV_PLANNED_MV{2}                                     0.938  0.938  0.682
2   SOCIAL{2}                                             0.938  0.938  0.556
3   TECH{0}                                               0.938  0.938  0.652
4   SOCIAL{2}*COV_PLANNED_MV{2}                           0.938  0.938  0.682
5   TECH{0}*COV_PLANNED_MV{2}                             0.938  0.938  0.682
6   TECH{0}*SOCIAL{2}                                     0.938  0.938  0.652
7   TECH{0}*SOCIAL{2}*COV_PLANNED_MV{2}                   0.938  0.938  0.682
8   SCHOOL{1}+COV_PLANNED_MV{0}                           0.938  0.938  0.577
9   SCHOOL{1}+POP_MV{0}                                   0.938  0.938  0.536
10  SCHOOL{1}+POP_MV{2}                                   0.938  0.938  0.577
11  SCHOOL{1}+SOCIAL{0}                                   0.938  0.938  0.577
12  SCHOOL{1}+HEALTH{1}                                   1.000  1.000  0.571
13  GEO{0}+SCHOOL{1}                                      0.938  0.938  0.577
14  GEO{1}+SCHOOL{1}                                      0.938  0.938  0.556
15  PRODUSE{0}+POP_MV{1}                                  0.938  0.938  0.682
16  PRODUSE{0}+HEALTH{1}                                  0.938  0.938  0.536
17  PRODUSE{0}+SCHOOL{1}                                  0.938  0.938  0.536
18  PRODUSE{1}+SCHOOL{1}                                  0.938  0.938  0.577
19  TECH{1}+SCHOOL{1}                                     0.938  0.938  0.577
20  GEO{1}+HEALTH{1}+POP_MV{0}                            0.938  0.938  0.536
21  PRODUSE{0}+GEO{1}+POP_MV{0}                           0.938  0.938  0.600
22  PRODUSE{0}+GEO{1}+SCHOOL{0}                           0.938  0.938  0.600
23  GEO{0}+HEALTH{0}+POP_MV{1}+COV_PLANNED_MV{0}          0.938  0.938  0.652
24  GEO{0}+HEALTH{0}+SOCIAL{0}+POP_MV{1}                  0.938  0.938  0.789
25  GEO{0}+SCHOOL{0}+HEALTH{0}+POP_MV{1}                  0.938  0.938  0.750
26  GEO{1}+SCHOOL{0}+HEALTH{0}+POP_MV{1}                  0.938  0.938  0.682
27  PRODUSE{0}+GEO{2}+HEALTH{0}+POP_MV{0}                 0.938  0.938  0.600
28  PRODUSE{0}+GEO{2}+SCHOOL{0}+HEALTH{0}                 0.938  0.938  0.600
29  PRODUSE{1}+GEO{0}+HEALTH{1}+POP_MV{0}                 0.938  0.938  0.556
30  PRODUSE{1}+GEO{1}+HEALTH{0}+POP_MV{1}                 0.938  0.938  0.600
31  TECH{1}+GEO{0}+HEALTH{0}+POP_MV{1}                    0.938  0.938  0.625
32  PRODUSE{1}+GEO{0}+HEALTH{0}+POP_MV{0}+COV_PLANNED_MV{0} 0.938 0.938 0.536
33  PRODUSE{1}+GEO{0}+HEALTH{0}+SOCIAL{0}+POP_MV{0}       0.938  0.938  0.556
34  PRODUSE{1}+GEO{0}+SCHOOL{0}+HEALTH{0}+POP_MV{0}       0.938  0.938  0.556
35  TECH{1}+PRODUSE{1}+GEO{0}+HEALTH{0}+POP_MV{0}         0.938  0.938  0.556
```

Table 3-18: mvQCA - necessity scores, negative.

```
                                                  incl   PRI   cov.r
  ---------------------------------------------------------------------
  1  HEALTH{1}+POP_MV{1}                           0.923  0.923  0.500
  2  SCHOOL{0}+HEALTH{1}                           0.923  0.923  0.571
  3  GEO{1}+HEALTH{1}                              0.923  0.923  0.500
  4  GEO{2}+HEALTH{1}                              0.923  0.923  0.545
  5  PRODUSE{0}+POP_MV{2}                          1.000  1.000  0.520
  6  TECH{1}+PRODUSE{0}                            0.923  0.923  0.500
  7  PRODUSE{1}+POP_MV{0}+COV_PLANNED_MV{0}        0.923  0.923  0.522
  8  PRODUSE{1}+HEALTH{0}+POP_MV{0}                0.923  0.923  0.500
  9  PRODUSE{1}+GEO{2}+POP_MV{0}                   0.923  0.923  0.545
 10  TECH{1}+GEO{1}+POP_MV{0}                      0.923  0.923  0.500
 11  GEO{0}+SCHOOL{0}+HEALTH{0}+POP_MV{2}          0.923  0.923  0.500
 12  GEO{2}+HEALTH{0}+POP_MV{0}+COV_PLANNED_MV{0}  0.923  0.923  0.500
 13  TECH{1}+HEALTH{0}+POP_MV{0}+COV_PLANNED_MV{0} 0.923  0.923  0.522
 14  TECH{1}+GEO{2}+HEALTH{0}+POP_MV{0}            0.923  0.923  0.500
```

Table 3-19: mvQCA - sufficiency score, positive.

```
                                    incl   PRI   cov.r
  ----------------------------------------------------------
  1  POP_MV{1}                       0.889  0.889  0.500
  2  HEALTH{0}                       0.778  0.778  0.438
  3  GEO{0}                          0.778  0.778  0.438
  4  PRODUSE{1}*COV_PLANNED_MV{2}    0.800  0.800  0.250
  5  TECH{0}*PRODUSE{1}              0.800  0.800  0.250
```

Table 3-20: mvQCA - sufficiency score, negative.

```
                                      incl   PRI   cov.r
  -------------------------------------------------------------
  1  COV_PLANNED_MV{0}                 0.800  0.800  0.308
  2  POP_MV{2}                         0.875  0.875  0.538
  3  TECH{1}                           0.833  0.833  0.385
  4  GEO{2}*HEALTH{1}                  0.800  0.800  0.308
  5  PRODUSE{1}*SCHOOL{1}*HEALTH{1}    0.750  0.750  0.462
```

Table 3-21: mvQCA - truth table analysis (minimization), positive.

	TECH	PRODUSE	GEO	SCHOOL	HEALTH	SOCIAL	POP_MV	COV_PLANNED_MV	OUT	n	incl	PRI
75	0	0	0	1	0	2	0	2	1	2	1.000	1.000
78	0	0	0	1	0	2	1	2	1	1	1.000	1.000
102	0	0	0	1	1	2	0	2	0	3	0.333	0.333
105	0	0	0	1	1	2	1	2	1	2	1.000	1.000
156	0	0	1	0	1	2	0	2	0	1	0.000	0.000
183	0	0	1	1	0	2	0	2	1	1	1.000	1.000
186	0	0	1	1	0	2	1	2	0	2	0.500	0.500
210	0	0	1	1	1	2	0	2	0	2	0.500	0.500
213	0	0	1	1	1	2	1	2	1	1	1.000	1.000
237	0	0	2	0	0	2	0	2	0	1	0.000	0.000
291	0	0	2	1	0	2	0	2	1	1	1.000	1.000
322	0	0	2	1	1	2	2	0	0	1	0.000	0.000
372	0	1	0	0	1	2	0	2	1	1	1.000	1.000
510	0	1	1	1	0	2	1	2	1	1	1.000	1.000
537	0	1	1	1	1	2	1	2	1	1	1.000	1.000
540	0	1	1	1	1	2	2	2	0	1	0.000	0.000
645	0	1	2	1	1	2	1	2	1	1	1.000	1.000
790	1	0	1	0	1	0	2	0	1	1	1.000	1.000
1177	1	1	1	1	1	1	2	0	0	1	0.000	0.000
1186	1	1	1	1	1	2	2	0	0	1	0.000	0.000
1294	1	1	2	1	1	2	2	0	0	1	0.000	0.000
1295	1	1	2	1	1	2	2	1	0	2	0.000	0.000

Table 3-22: mvQCA - results (positive outcome).

		incl	PRI	cov.r
1	TECH{0}*GEO{1}*SCHOOL{1}*HEALTH{1}*SOCIAL{2}*POP_MV{1}*COV_PLANNED_MV{2}	1.000	1.000	0.125
2	TECH{0}*PRODUSE{0}*GEO{0}*SCHOOL{1}*SOCIAL{2}*POP_MV{1}*COV_PLANNED_MV{2}	1.000	1.000	0.188
3	TECH{0}*PRODUSE{0}*SCHOOL{1}*HEALTH{0}*SOCIAL{2}*POP_MV{0}*COV_PLANNED_MV{2}	1.000	1.000	0.250
4	TECH{0}*PRODUSE{1}*GEO{1}*SCHOOL{1}*SOCIAL{2}*POP_MV{1}*COV_PLANNED_MV{2}	1.000	1.000	0.125
5	TECH{0}*PRODUSE{1}*GEO{0}*SCHOOL{0}*HEALTH{1}*SOCIAL{2}*POP_MV{0}*COV_PLANNED_MV{2}	1.000	1.000	0.062
6	TECH{0}*PRODUSE{1}*GEO{2}*SCHOOL{1}*HEALTH{1}*SOCIAL{2}*POP_MV{1}*COV_PLANNED_MV{2}	1.000	1.000	0.062
7	TECH{1}*PRODUSE{0}*GEO{1}*SCHOOL{0}*HEALTH{1}*SOCIAL{0}*POP_MV{2}*COV_PLANNED_MV{0}	1.000	1.000	0.062

Table 3-23. mvQCA-results (negative outcome).

		incl	PRI	cov.r
1	TECH{0}*PRODUSE{0}*GEO{1}*HEALTH{1}*SOCIAL{2}*POP_MV{0}*COV_PLANNED_MV{2}	0.667	0.667	0.154
2	TECH{0}*PRODUSE{0}*GEO{0}*SCHOOL{1}*HEALTH{1}*SOCIAL{2}*POP_MV{0}*COV_PLANNED_MV{2}	0.667	0.667	0.154
3	TECH{0}*PRODUSE{0}*GEO{1}*SCHOOL{1}*HEALTH{0}*SOCIAL{2}*POP_MV{1}*COV_PLANNED_MV{2}	0.500	0.500	0.077
4	TECH{0}*PRODUSE{0}*GEO{2}*SCHOOL{0}*HEALTH{0}*SOCIAL{2}*POP_MV{0}*COV_PLANNED_MV{2}	1.000	1.000	0.077
5	TECH{0}*PRODUSE{0}*GEO{2}*SCHOOL{1}*HEALTH{1}*SOCIAL{2}*POP_MV{2}*COV_PLANNED_MV{0}	1.000	1.000	0.077
6	TECH{0}*PRODUSE{1}*GEO{1}*SCHOOL{1}*HEALTH{1}*SOCIAL{2}*POP_MV{2}*COV_PLANNED_MV{2}	1.000	1.000	0.077
7	TECH{1}*PRODUSE{1}*GEO{1}*SCHOOL{1}*HEALTH{1}*SOCIAL{1}*POP_MV{2}*COV_PLANNED_MV{0}	1.000	1.000	0.077
8	TECH{1}*PRODUSE{1}*GEO{1}*SCHOOL{1}*HEALTH{1}*SOCIAL{2}*POP_MV{2}*COV_PLANNED_MV{0}	1.000	1.000	0.077
9	TECH{1}*PRODUSE{1}*GEO{2}*SCHOOL{1}*HEALTH{1}*SOCIAL{2}*POP_MV{2}*COV_PLANNED_MV{0}	1.000	1.000	0.077
10	TECH{1}*PRODUSE{1}*GEO{2}*SCHOOL{1}*HEALTH{1}*SOCIAL{2}*POP_MV{2}*COV_PLANNED_MV{1}	1.000	1.000	0.154
	S1	0.812	0.812	1.000

Results of fsQCA

Table 3-24: fsQCA - the dataset with fuzzy values.

Case no	tech	geo	produse	school	health	social_fs	pop_fs_r	cov_fs_r	out_fs_r
1	0	1	1	0	1	1	0.21	0.81	0.78
2	0	0	0	1	1	1	0.37	0.85	0.67
3	1	0	0	0	1	0	0.76	0.07	0.8
4	0	1	0	1	0	1	0.38	0.85	0.55
5	0	1	0	1	1	1	0.46	0.81	0.78
6	0	0	0	1	1	1	0.06	0.7	0.77
7	0	1	0	1	1	1	0.19	0.93	0.5
8	0	0	0	1	0	1	0.44	0.93	0.52
9	0	1	0	1	1	1	0	0.85	0.46
10	0	1	0	1	0	1	0.28	0.85	0.86
11	1	0	1	1	1	0.75	1	0.07	0.26
12	1	1	1	1	1	1	0.97	0.33	0.47
13	0	1	0	1	1	1	0.62	0.07	0
14	1	1	1	1	1	1	0.62	0.37	0.24
15	0	0	1	1	0	1	0.35	0.85	0.55
16	0	0	0	1	0	1	0.18	1	0.78
17	0	0	0	0	1	1	0.3	0.81	0.38
18	0	1	0	1	0	1	0.26	0.78	0.55
19	0	1	0	0	0	1	0.18	1	0.09
20	1	1	1	1	1	1	0.97	0	0.17
21	0	0	0	1	0	1	0.41	0.93	1
22	0	1	0	1	1	1	0.15	0.89	0.77
23	0	0	1	1	1	1	0.34	0.89	0.58
24	0	1	0	1	1	1	0.41	0.78	0.77
25	0	1	1	1	1	1	0.43	0.81	0.73
26	0	1	0	1	0	1	0.21	0.78	0.55
27	1	0	1	1	1	1	0.83	0.07	0.3
28	0	0	1	1	1	1	0.54	0.96	0.5
29	0	0	0	1	1	1	0.26	0.96	0.51

Table 3-25: fsQCA - necessity scores with low consistency threshold.

	incl	PRI	cov.r
SOCIAL_FS	0.950	0.934	0.543
health	0.342	0.342	0.603
HEALTH	0.658	0.658	0.522
SCHOOL	0.872	0.872	0.553
pop_fs	0.828	0.390	0.780
POP_FS	0.534	0.096	0.696
cov_fs	0.328	0.092	0.579
COV_FS	0.898	0.662	0.712
produse	0.711	0.711	0.594
PRODUSE	0.289	0.289	0.458
geo	0.480	0.480	0.585
GEO	0.520	0.520	0.516
tech	0.859	0.859	0.592

Further OLS results

Table 3-26: OLS - table with individual regressions for each condition.

Significant effects: technology, population, coverage rate planned.

	ols_1	ols_2	ols_3	ols_4	ols_5	ols_6	ols_7	ols_8
(Intercept)	105.217***	104.385***	105.211***	95.000***	92.500***	106.667***	129.337***	-10.628
	(6.816)	(9.664)	(7.801)	(24.909)	(17.574)	(11.602)	(14.736)	(35.689)
data$tech1	-31.384*							
	(14.984)							
data$geo1		-10.260						
		(13.010)						
data$produse1			-18.811					
			(13.284)					
data$social_cs1				4.000				
				(25.815)				
data$school1					7.220			
					(18.927)			
data$health1						-11.517		
						(13.971)		
data$pop2007							-0.071*	
							(0.031)	
data$cov_planned								1.458**
								(0.470)
R-squared	0.140	0.023	0.069	0.001	0.005	0.025	0.161	0.263
adj. R-squared	0.108	-0.014	0.035	-0.036	-0.031	-0.012	0.130	0.236
sigma	32.686	34.843	34.002	35.226	35.147	34.807	32.285	30.258
F	4.387	0.622	2.005	0.024	0.146	0.680	5.172	9.627
p	0.046	0.437	0.168	0.878	0.706	0.417	0.031	0.004
Log-likelihood	-141.235	-143.088	-142.379	-143.405	-143.340	-143.057	-140.877	-138.996
Deviance	28846.746	32778.827	31215.558	33504.000	33354.040	32710.550	28143.287	24719.991
AIC	288.470	292.175	290.758	292.810	292.680	292.115	287.754	283.993
BIC	292.572	296.277	294.860	296.912	296.782	296.217	291.856	288.094
N	29	29	29	29	29	29	29	29

4. The regional trade dynamics of Turkey: a panel data gravity model

Written in collaboration with:

Prof. Dr. Hakan Yetkiner

Department of Economics, Izmir University of Economics, 35330, Izmir, Turkey

4.1. Introduction

In history, the Turkish state has frequently found itself in a bridge-builder position for regions and religions, interconnecting Europe, Asia, and the Middle East. Since the 1950s, Turkey has maintained close political and economic relations with the Western world. In 1952, Turkey became a member of the NATO and applied to join the European Economic Community (EEC) in 1959, which resulted in the Ankara Agreement in 1963. Turkey strengthened its economic and political ties with the Western World by entering the Customs Union of the EU in 1996, even though its EU membership application had already been rejected in 1989. Since then, two interdependent developments have substantially affected Turkish politics and economics. First, after the collapse of the Soviet Union in 1989, Turkey has been affected by major changes in the Middle East, North Africa, the Caucasus, Eastern Europe and Central Asia. Second, after long-term political and economic turmoil, since 2001, Turkey has been enjoying a period of political stability and economic success. Turkey has developed extensive trade relations in almost all regions, including the recently emerging economies after the collapse of the Soviet-Union. Here, the important issue is whether, as an emerging economy in a global environment, Turkey is merely expanding its political and economic power to other recently developing economies, or is it in fact turning away from the West.[46] This paper aims to provide an (indirect) answer to this question by examining the trade patterns of Turkey in terms of regional clusters (RCs) and bilateral trade costs (BTCs) at the aggregate and sectoral level in a panel data gravity model.

---

[46] The discussion on "losing Turkey for the West" is wide spread in the news but also in political literature (Kennedy and Dickenson, 2012). The more moderate side claims that Turkey could play a role as a "trade platform" of the different close-by regions (Antonucci and Manzocchi, 2006, p. 168) and this without neglecting its former strong relationship to the Western states, but by maintaining Europe as partner and including emerging neighbors into its regional and global trade patterns. To put this argumentation and this research into a broader, descriptive context, the appendix includes a descriptive analysis and discussion of Turkish trade history (4.4.2), trade concentration (4.4.3), and relative changes of trading partners (4.4.4).

A general impression of Turkey's trade pattern can be gained by examining the simple country concentration and ranking analysis. While our analyses show no great variation in the concentration, there were changes in the composition of countries for various concentration groups, and more importantly, for regions. In particular, we find that trade concentration ratios are stable for import and export flows for the ten, twenty, and fifty most important trading partners, but there are substantial changes in the composition of these groups and for different regions, especially in the last ten to twenty years.[47] A similar pattern emerges when the country ranks of Turkish trade are analyzed. For example, country ranks of Turkish imports between 1996 and 2012 for the ten countries that have the highest rank in 2012 show that some countries, such as Russia, China, Iran, India and South Korea, have become significant sources of Turkish imports. Increasing import flows with Iran and Russia reflect Turkey's rising energy dependency due to growing manufacturing and service industries. On the other hand, the increasing importance of China as a source country for Turkey (as well as for the world) is due to the growing need for intermediate and capital goods to supply the growing manufacturing and service industries. Similarly, country ranks of Turkish exports between 1996 and 2012 for the ten countries that have the highest rank in 2012 show that some countries such as Iraq, the United Arab Emirates (U.A.E.) and Iran have become significant exporting partners of Turkey.[48]

In Figure 4-1 and Figure 4-2, we assess these changes in trade partners by discussing trade shares for different regions. Ten exclusive regions are defined to cover Turkish trade with the whole world. As only five have significant trade shares, the remaining regions are aggregated under "others" as the sixth region. The most important regions are the EU-27 countries, other European countries, North American Countries, the Middle-East, and Asian Countries. The EU-27 is Turkey's most important trading partner by far. Nevertheless, its share has decreased from more than 50% to below 40%. The North American countries show a similar pattern. In contrast, three other regions gained ground and increased their trade shares. The other European countries had an increasing trade share, but only until the crisis in 2009. Two groups of countries, the Middle East and Asian countries (including China and India), have continued to increase their share, both currently at the level of 15% of total Turkish trade. When we analyzed exports separately, it seems that Turkey has

---

[47] Not shown but available from the authors upon request. We calculated the following ratios over time: Concentration Ratio, Herfindahl- Hirschman Index, Rosenbluth-Hall-Tideman Index, Entropy-Index, and Comprehensive Measure of Concentration Index. Only the Comprehensive Measure of Concentration Index (CCI) decreases substantially, as it depends more on the historically most important trade partner, Germany.

[48] It should be noted that exports to U.A.E. may not be the ultimate destination; a significant amount of exports to this country is re-exported to neighboring countries, legally or not.

discovered new markets in the neighboring regions as the trade share for the Middle East countries has increased almost three-fold and approach the EU-27 level, cf., Figure 4-1. With regard to imports, cf., Figure 4-2, the Asian countries play a much more prominent role, as they have the second highest share with regard to imports. As this region includes India and China, an increase in imports is not unexpected. However, the doubling of the trade share is still remarkable.
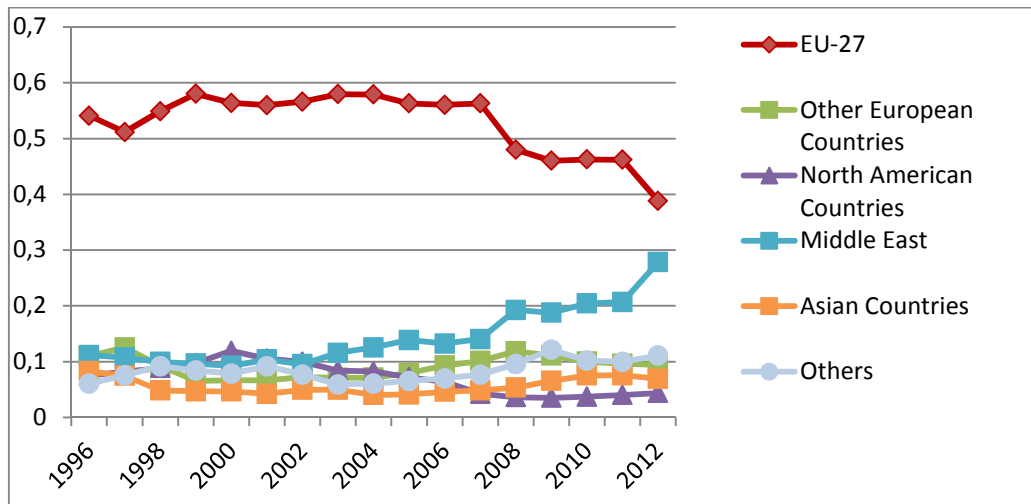

Figure 4-1: Trade shares for Turkish exports to world regions.[49]
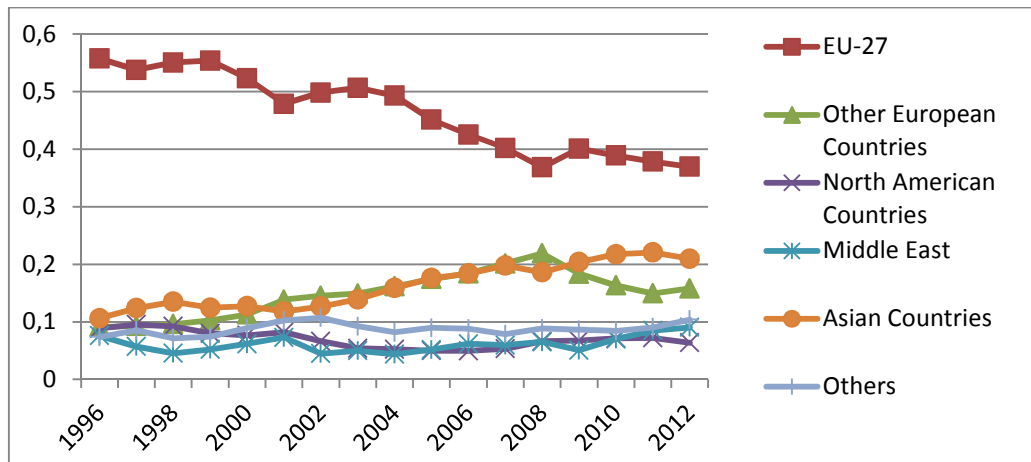
Figure 4-2: Trade shares for Turkish imports from world regions.

Source: Turkish Statistical Institute.

Consequently, there have been significant changes in Turkish trade concentration. While the accumulated shares remain relatively unchanged – we get the same results for the 50 and 90 major

---

[49] Note for EU-27 = European Union (before accession, trade shares are still accumulated for the 27 EU countries)

trading partners – there are clear differences in the composition of the trading partners. All in all, we find a diversification of total trade, exports and imports with regard to the world regions, the Middle East and the Asian countries gained shares at the expense of Europe and North America. The question that arises from this descriptive analysis is to determine the exact role of regional clusters (RCs) and bilateral trade costs (BTCs) in the trade dynamics of Turkey.

Since Tinbergen (1962) introduced the gravity model for economic analysis, there have been numerous applications.[50] Several papers using the gravity approach have studied the role of regional clusters and/or bilateral trade costs with regard to the trade patterns of one selected economy, such as Montenegro and Soto (1996) for Cuba, Sohn (2005) for South Korea, Lissovolik and Lissovolik (2006) for Russia, Oh and Tumurbaatar (2011) for Bangladesh, Busse and Groening (2012) for Jordan, Oh and Laxmi (2012) for Nepal, Tripathi and Leitão (2013) for India, and Josheski and Apostolov (2013) for Macedonia. Identifying the trade flows predicted by the gravity model and further significant effects of RCs and BTCs or individual countries, each of these papers provides an explanatory basis for the existing or changing trade patterns in the country concerned.

With regard to gravity-related studies on Turkey and Turkish trade, much has been written on EU-Turkey trade relations. For example, Moghaddam and Artatrana (2011) and Adam and Moutos (2008) discuss a particularly popular topic, the potential of Turkish EU accession to affect changes in the trade flows of Turkey and EU countries. While the former work finds that Turkey and the EU already overtrade, and therefore questions the value of EU accession, the latter discusses the effects of full EU membership on Turkey, and is critical of the potential economic effects of EU accession. While these studies focus on aggregated trade, Nowak-Lehmann et al. (2005, 2007) show in a sectoral trade analysis that the customs union (CU) with the EU only slightly increases Turkish exports. This is partly due to the exclusion from the agreement of major exports such as agriculture, coal and steel, which have great potential to increase if the EU were to abandon protection. None of these works, however, focus on the issues of the role of regional clusters (RCs) and bilateral trade costs (BTCs) on the pattern of trade in Turkey. There are relatively few studies focusing specifically on Turkey in trade analysis. Antonucci and Manzocchi (2006) and Bilici et al. (2009) both focus on EU-Turkey trade before and after the Customs Union, showing that EU-Turkey trade is generally in line with expectations based on gravity model estimations. These studies also compare the trade between Turkey and the EU and trade between Turkey and other regions, finding that trade with

---

[50] See the next section for a brief review of gravity literature.

neighboring regions outside the EU exceeds the expectations based on a gravity model estimation. As a side note, Antonucci and Manzocchi (2006) suggest the idea that Turkey has the role of a trade platform in the region – an argument that is one starting point for our research. Our contribution to the existing literature is to work with a much wider database, and augment their models by including regional clusters (RCs) and bilateral trade costs (BTCs), and hence to provide a more in-depth analysis of the determinants of Turkey's trade pattern.

The aim of this work is to analyze Turkish trade dynamics with regard to regional clusters (RCs) and bilateral trade costs (BTCs), using a panel data gravity model. The study analyzes the role of RCs and BTCs in two complementing phases: The first phase consists of an analysis of the role of RCs and BTCs in explaining export and import patterns of Turkey at the aggregate by using unbalanced panel data from the IMF's Direction of Trade Statistics (DOTS) database for 180 countries over the period 1960-2012 (about 6 thousand observations). As an extension, the exercise is repeated for four different time intervals, namely 1963-1980 (Eligibility for EEC), 1980-1995 (Democratization), 1995-2005 (CU and candidacy) and 2005-2012 (Open-ended negotiations). In the second phase, we repeat the exercise with disaggregated data at the sectoral level (agriculture, textiles and footwear, machines, and energy) from the BACI database for 176 countries over the period 1994 to 2010.[51] In both analyses, we find that (i) the gravity model is very effective in explaining Turkish export and import flows; (ii) EU27 has a high and statistically significant impact on Turkish trade; (iii) all neighboring regions have a high and significant impact on Turkish trade flows; (iv) the EU customs union (CU) has a negative effect on Turkish exports and a positive effect on imports from the EU; (v) sectoral level analyses indicate that while some regions (e.g., Russia, EU27, North Africa, and Middle East) contribute positively to Turkish exports and imports, others, including North America, contribute negatively. The organization of the paper is as follows: subchapter 4.2 introduces the model, data and the empirical analysis, and subchapter 4.3 concludes.

4.2. Methodology, data and findings

In this paper, we relate Turkey's foreign trade to economic and other (political, social, geography, etc.) variables through the application of a gravity model. This section first introduces the gravity

---

[51] BACI is the World trade database developed by the French Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) at a high level of product disaggregation. This database extends considerably the number of countries for which trade data are available, as compared to the original dataset.

model and our estimation approach. Next, we talk about the characteristics of the two databases we used. Finally, we present and discuss the results of the estimation.

4.2.1. Methodology

The gravity model, described as a "workhorse" (Head and Mayer, 2014) of international trade analysis, was first introduced by Jan Tinbergen (1962). A first theoretical micro-foundation for the model was put forward by Anderson (1979). Only after its recent reintroduction by Anderson and van Wincoop (2003), however, has it received proper attention. The basic gravity model can be shown as follows:

$$X_{ij} = G \frac{Y_i^{\beta_1} \cdot Y_j^{\beta_2}}{D_{ij}^{\beta_3}} \tag{1}$$

In this simplest form, the gravity model explains the trade flows X_{ij} from country i to j, exports or imports, with the economic size Y of the partner countries, often approximated by the GDP, and the bilateral distance D, e.g. the geographic distance. D is generally defined as the bilateral trade costs in recent gravity studies. Trade is expected to depend positively on economic size, and negatively on distance. In addition, the gravity equation includes a "gravitational" constant, which is independent of i or j, that captures country independent effects/ factors, such as the level of world liberalization.

On the basis of this basic model, our estimation equation in log-linear form can be displayed as follows:

$$\ln X_{ijt} = \beta_0 + \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} + \beta_{3-13} DIST_{ijt} + \beta_{14-25} REG + \beta_{26} s_{ijt} + \delta_t + \epsilon_{ijt} \tag{2}$$

X_{ijt} is the volume of trade (exports or imports) from country i to country j over time t. β_0 is the constant. Y_{it} is the GDP in country i at time t and is used as indicator for the economic size; the same for Y_{jt} and country j. DIST includes eleven trade-cost variables and REG represents 12 dummy variables representing regions which are used to reveal the role of regions in explaining Turkey's trade (both variables are discussed in detail below). s_{ijt} is a proxy for multilateral resistance developed by Head (2003) to account for the theoretical implication of the gravity model by Anderson and van Wincoop (2003). The multilateral resistance integrates the relative trade costs

of the other partner countries into the model, because bilateral trade relations are highly dependent on the outward and the inward resistance towards all other trade partners. Several proxies for multilateral resistance are suggested for empirical research. We will use remoteness, which is calculated as the country's average weighted distance from all its trading partners, in which the country's share in world GDP is used as weight (Head and Mayer 2014).[52] Finally, we apply time effects (δ_t) and ϵ_{ij} denotes the residual term. We estimate the model by the fixed effects method (FEM) (Shepherd 2008), as indicated by the Hausman test.[53]

The trade-cost matrix $DIST_{ijt}$ consists on the one hand of typical cost variables generally applied in the gravity literature and Turkey-specific variables on the other hand. The trade-costs variables are defined as follows:

$$DIST_{ijt} = \beta_3 \ln dist w_{ij} + \beta_4 contig_{ij} + \beta_5 turclang_j + \beta_6 comlang_j + \beta_7 prefTRADEagr_{ijt} +$$
$$\beta_8 FTAs\_noCU_{ijt} + \beta_9 EU\_CU_{ijt} + \beta_{10} OIC_{ijt} + \beta_{11} BSEC_{ijt} + \beta_{12} noEUmem1989_{jt} + \beta_{13} CYP_j$$

$$(3)$$

First of all, we add the geographical distance $distw_{ij}$ from Turkey (i) to the partner country j. Here, we calculate distance as log of intercity distances weighted by population shares following the approach of Head and Mayer (2002). We use a contiguity dummy $contig_{ij}$ for partner countries j who share the same border with Turkey i. Second, we use two cultural-similarity dummies: $turclang_j$ measures whether one of the country j's official languages has a common root with the Turkish language and $comlang_j$ controls for whether there is a substantial Turkish speaking minority in country j. Third, we use dummies for the Turkey-specific trade agreements. We focus on the preferential trade agreements ($prefTRADEagr_{ijt}$) of Turkey i and the partner country j which also change over time t. Trade agreements are separately analyzed if it is an FTA ($FTAs\_noCU_{ijt}$)

---

[52] We acknowledge criticism on the remoteness proxy, e.g. by Anderson and van Wincoop (2003), but still use this variable as additional control for the multilateral resistance as we use region instead of country fixed effects. Furthermore, Spies and Marques (2009, p.7) underline that there are at least five practices to account for multilateral resistance, all different in practicability and theoretical foundation. That multilateral resistance has to be considered is highlighted in the standard paper of Baldwin and Taglioni (2006).

[53] We may provide Hausman test statistics on demand. In addition, Antonucci and Manzocchi (2005) point to the fact that for an REM (Random Effect Method) estimation trade flows should be a randomly drawn sample of trading partners from a larger population while for FEM is the better choice when trade flows are analyzed for a previously identified selection of countries (Berber, Metin and Artan, 2007, p.71; Egger, 2000; Egger, 2005). While we follow the approach of Antonucci and Manzocchi (2005) with regard to fixed effects, the use of a two-step-procedure, introduced by Cheng and Wall (2003)), has not been applicable for our research as we do not focus on one selected change in a time-varying dummy.

and also separately if the countries i and j are both members of the Turkey-EU customs union (EU_CU_{ijt}). Furthermore, we control for the memberships in the Organization of Islamic Countries (OIC_{ijt}) and the Black Sea Economic Cooperation Region ($BSEC_{ijt}$) which also change over time t. Lastly, dummy variable $noEUmem1989_{jt}$ denotes whether the partner country j was a member of the EU in 1989, in order to measure any effect of the rejection of Turkish membership, and dummy CYP is added to account for the persistent conflict-related bias of Turkish-Cypriot trade relations since 1974.

The REG vector includes the following regions, altogether covering 174 countries: Caucasus, Central Asia, Eastern Asia, EU27 countries, European countries outside the EU27, Latin America, Middle East, North Africa, North America, Russia, South Asia, and Sub-Saharan Africa. It can be seen that we have smaller breakdowns for Europe, which is divided into EU27 and non EU27 countries, and the MENA region, which is divided into the Middle East and North Africa. Furthermore, we use a separate dummy for Russia and the Caucasus countries. Each country can only be a member of one specific region.[54]

4.2.2. Data

Our empirical analysis exploits two different datasets. First, for the aggregate analysis, we use an unbalanced panel of annual observations that covers a total of 180 countries over a 52-year period (1960–2012). For this basic regression of long-term, aggregated Turkish trade, we use the IMF's DOTS database which allows access to trade data from 1960 to 2012 (International Monetary Fund, 2013). The second dataset, the BACI-CEPII database (Gaulier and Zignago, 2010), covers disaggregated, annual trade data for a total of 176 countries and the time period 1994-2010. For our research, we use disaggregated data for four sectors: agriculture, textiles and footwear, machines, and energy.[55] GDP data has been retrieved from the World Development Indicators (World Bank, 2013). Trade cost variables were either taken from the CEPII website (No. 3-6) (Gaulier and Zignago, 2010) or were coded using information from the World Trade Organization (2013a, 2013b) and the Turkish Ministry of Economy (No. 7-11) (Republic of Turkey (2012)).

---

[54] An overview of the regional dummies with the respective countries is provided in the appendix 4.4.1.
[55] Countries dropped due to data restrictions were neither major trading partners nor were they numerous. Besides some limits of Yugoslavian and Czechoslovakian data, only smaller islands in the Caribbean and the Pacific Ocean could not be covered by both datasets.

4.2.3. Findings

We study the determinants of Turkish imports and exports at three different levels: 1) aggregate, 2) aggregate in four specific time periods, and 3) sectoral. Table 4-1 below presents the determinants of Turkish imports and exports for the aggregate data. The regression in column (1) explains Turkish export flows only with economic size (GDP, with (i) for Turkey and (j) for the partners) and geographical distance (DIST). In column (2), we add basic bilateral trade cost variables and a remoteness proxy (s) as described above in the model. The coefficients of gravity variables are consistent with the other empirical findings in size and sign. We also observe that the explanatory power of the model increases. In column (3), we add the regional dummies that again lead to an increase in explanatory power.

For aggregated exports and aggregated imports, the estimation results for economic size (GDP) and distance are consistent with theory. Imports are more prone to be influenced by remoteness, but the effect is minimal. For exports, the contiguity and cultural links seem to have minimal effect, but for imports, the two cultural dummies are positive. Trade agreements are ambiguous, as preferential trade agreements have a significant positive effect, while FTAs are not significant. This could be due to the fact that Turkey's preferential trade agreements (PTA) are long-standing and therefore could affect trade over a longer period of time, while Turkish FTAs are quite new. For Turkish exports, the customs union with the EU had a significant negative effect, and for imports, a lower but positive effect. These results support the hypothesis of previous studies, that there was little advantage for Turkey in this customs union, without removing quality standards used as hidden barriers and obstacles for Turkish agricultural products, as Turkey already had an established pattern of trade. Partly, this reflects findings by Robles et al. (2012), but here we have the effects following the standard effects for MENA countries, which points to a necessary reconsideration when discussing the special Turkey-EU effects in this paper. The membership within the OIC and the BSCE seems to explain significantly positive effects on exports and imports, except for the imports from the OIC countries, which is due to great development gaps in economies of OIC countries and Turkey. The rejection of a Turkish EU membership had a negative effect on imports. The last trade cost dummy (the conflict with Cyprus) is, as expected, strongly negative.

Table 4-1: Aggregate gravity estimates.

Dependent Variable	Export (log)			Import (log)		
	(1)	(2)	(3)	(1)	(2)	(3)
lgdp_j	1.0040***	1.0289***	0.9900***	1.2590***	1.2450***	1.2335***
lgdp_i	0.6028***	0.5740***	0.6483***	0.2828***	0.2503***	0.2671***
ldistw	-1.6247***	-1.6278***	-0.9258***	-1.3264***	-1.4471***	-1.1533***
s (Remoteness)		-0.0000	-0.0000		0.0000	0.0001***
Contig		0.0045	0.1307		-0.2089	0.2570
d_turclang		1.4673***	0.0018		2.6815***	1.4328***
comlang_ethno		-0.3189**	-0.1673		1.0136***	0.7147**
d_prefTRADEagr		-0.0135	0.1391**		0.4306***	0.5527***
d_FTAs_noCU		-0.0850	-0.0126		0.1079	0.1247
d_EU_CU		-0.5937***	-0.7793***		0.3489***	0.2716***
d_OIC		0.4905***	0.4015***		-0.0161	-0.1820*
d_BSEC		0.1119	0.3669***		0.2298	0.4684***
d_noEUmem1989		0.1206	-0.0724		-0.2970***	-0.4474***
d_CYP		-5.9249***	-4.1393***		-6.7347***	-4.8476***
d_Russia			0.5286***			1.6271***
d_memberEU27			1.3503***			1.4310***
d_NorthAfrica			1.4815***			2.0178***
d_MiddleEast			1.3852***			1.3646***
d_CentralAsia			2.4186***			2.8366***
d_Caucasus			1.8730***			0.9952**
d_NorthAmerica			0.5960***			0.3300**
d_LatinAmerica			-0.5355***			-0.0085
d_SouthAsia			0.0460			0.5655**
d_EasternAsia			0.0756			0.3935**
d_SubSaharanAfrica			0.2035*			0.9273***
d_EuropeNot27			0.8294***			1.2352***
Constant	-8.9031***	-8.7693***	-16.2263***	-9.9610***	-8.0116***	-11.9317***
Observations	5,779	5,779	5,779	5,198	5,198	5,198
R-squared (adj.)	0.8135	0.8370	0.8468	0.7007	0.7176	0.7242
Robust pval in brackets, *** p<0.01, ** p<0.05, * p<0.1						

With regard to the actual effect of a change in the regional dummies, we can interpret for example the Central Asia regional coefficient in (3) as follows: the effect of 2.4186 indicates that, from 1960 to 2012, the trade between Turkey and a member of the Central Asian region has been ten times higher than trade between Turkey and other regions, despite the fact that we controlled for several variables.[56] In our research, the effect of the neighboring regions is especially interesting: Europe, Middle East, North Africa, Caucasus, and Central Asia. In addition, most of the trade with Latin

---

[56] To calculate the effect in percentage, we apply the following calculation: $100*[\exp(\text{coefficient})-1]$, which in this case is 1,023%. We show the regression results with a constant, as then R-squared is valid for LSDV estimations. The regression results without constant that allow for a direct interpretation of each dummy coefficient lead to the same results up to the fourth digit.

America, North America, and Asia seems explainable by changes in their GDP and the invariant distance. For the closer regions, it is less evident. The effects for these regions are significant, and notably higher than for the other regions. They are less explainable by GDP and distance. Comparing these neighboring regions with each other, including Europe, we find a comparable effect. We see already for this pooled regression that the European dummy is neither negative nor extremely lower than the dummies for comparably geostrategic important and close-by regions. For the issue of the direction in which Turkey is heading, we also would like to know, if Turkey seems to be aiming to diversify its trade relations without sacrificing its close relations to Europe or if it is "turning away from the West". For an analysis of such a trend, we divided our sample into four different time intervals, following Esfahani and Gürakar (2013). Table 4-2 displays the results for four political or economic regimes: the eligibility for membership in EEC starting with the Ankara Agreement (1963-1980), the period of the coup, reform and democratization period (1980-1995), the customs union with the EU and the EU candidacy (1995-2005) and the now open-ended negotiations (2005-2012).

We can see that while the effect of the EU27 region decreased significantly for exports, it remains constant if imports are the dependent variable. For the regions which are generally compared, e.g. Middle East, the regional coefficients are partly higher and generally reached a peak shortly after the fall of the iron curtain. Nevertheless, while some regions, such as the Central Asian region, currently show a strong, unexplained regional effect, relations with Europe have not been dramatically affected, e.g. by a change to a negative coefficient.

Table 4-2: Turkish trade flows for selected time periods (DOTS).

Dependent Variable	Export (log)				Import (log)			
Period	(1) 1963-80	(2) 1980-95	(3) 1995-05	(4) 2005-12	(1) 1969-80	(2) 1980-95	(3) 1995-05	(4) 2005-12
lgdp_j	1.061***	1.045***	0.962***	0.878***	1.091***	1.150***	1.225***	1.340***
lgdp_i	-0.169	0.895***	0.941***		-0.415***	1.122***	0.360*	
Ldistw	-1.109***	-0.983***	-1.446***	-0.946***	-0.513	-1.215***	-1.744***	-0.276
s (Remoteness)	-0.000	-0.000	0.000***	0.000	-0.000	0.000**	0.000***	-0.000
contig	-0.527**	0.349*	-0.157	0.434**	-1.086***	0.659**	1.380***	1.225***
d_turclang	-2.922***	1.533**	0.199	-0.093	0.454	1.397**	1.624***	1.676***
comlang_ethno		-0.639**	0.823***	0.536**		-0.394	0.800**	-0.170
d_prefTRADEagr	0.672*	0.039	0.227**	0.496***	-0.495	0.082	1.000***	0.847***
d_FTAs_noCU	1.535***	0.141	-0.009	0.166**	0.539	-0.379*	-0.049	0.690***
d_EU_CU			-0.243**	-0.401***			0.272	-1.651***
d_OIC	0.234	0.315**	0.338***	0.191*	0.236	0.155	-0.606***	-0.081
d_BSEC			0.047	0.157			-0.631**	0.595**
d_noEUmem1989		-0.348***	0.338***	0.383**		-0.452***	-0.405**	0.189
d_CYP		-4.979***	-6.722***	-3.481***		-2.457***	-6.047***	-8.583***
d_Russia		1.320***	0.543**	0.295		1.705***	2.636***	1.212**
d_memberEU27	1.360***	1.290***	0.599***	0.732***	1.080**	1.410***	1.605***	2.679***
d_NorthAfrica	1.144***	1.956***	1.202***	1.405***	0.487	1.888***	3.250***	2.225***
d_MiddleEast	1.081**	1.967***	0.849***	0.898***	2.173***	1.331***	1.052**	0.677
d_CentralAsia		2.089***	2.394***	2.081***		1.765***	3.318***	2.871***
d_Caucasus		0.797	2.280***	1.435***		0.715	1.504**	-0.491
d_NorthAmerica	0.534**	0.809***	0.570***	0.347**	0.645*	0.463*	0.244	-0.220
d_LatinAmerica	-1.186***	-0.624***	-0.149	-0.261**	-0.534*	-0.416*	-0.004	0.571**
d_SouthAsia	-0.914*	0.763**	-0.133	-0.046	0.031	0.439	0.883***	0.686
d_EasternAsia	0.473*	0.828***	-0.440***	-0.798***	-0.042	0.387	0.703**	0.210
d_SubSaharanAfrica	-0.782**	0.160	0.298*	0.698***	-0.390	0.428	1.592***	1.167***
d_EuropeNot27	0.874**	0.612**	0.630***	0.734***	0.936*	0.968**	1.580***	1.406***
Constant	2.475	-24.587***	-19.889***	4.268***	3.051	-31.777***	-9.987*	-14.087***
Observations	1,012	1,670	1,824	1,354	826	1,418	1,714	1,316
R-squared (adjusted)	0.810	0.816	0.842	0.857	0.639	0.697	0.746	0.739
***Robust pval in brackets								

If we analyze the neighboring regions, we find changing but stable trade patterns in different regimes: With regard to exports, coefficients for Russia and the EU27 decreased by half, while imports remained stable or even increased. With regard to Russia, this fact underlines that, although Turkey discovered alternative markets for exports, it still relies on countries such as Russia as a source of energy imports. Exports to the EU27 member states decreased significantly, but imports from the EU increased, especially after the Eastern enlargement. The "remaining European states" also provide a significantly positive effect for both exports and imports. The other neighboring regions generally gained in exports and imports, or had already a high coefficient. For North Africa,

imports in particular, increased while exports remained stable.[57] For the Middle East, the effect is also high, but decreasing. Here, within the region, different geopolitical effects are included in the regional dummy, e.g. strongly positive for Iran, but negative for Syria or Saudi Arabia, thus reducing the regional effect in total. The Central Asian states gained momentum immediately after their emergence in the 90s. Turkey's membership of this region had a strong impact on both imports and exports, reflecting its strong regional trading power. Interestingly, the effect for the Caucasus is also strong for exports, comparable to the Central Asian states, but imports remain low. Furthermore, it has to be highlighted that trade is positive, despite significant distortions within the region caused by local conflicts especially between Armenia and Turkey.[58] If we consider the other world regions, we have the Western hemisphere with the USA and Canada also losing importance, while Latin America is stable with its negative coefficient, indicating a clear trade potential with this region. For South Asia, the membership of this region seems to have a significant effect only for imports. Eastern Asia is different, as for exports this region seems to have undergone a dramatic trade pattern change: the region seems to import far less than its GDP and trade cost data imply, while imports remain low, but positive and partly significant. Here, the market for Turkish products seems not to be effectively exploited in this region, while in contrast, Turkish imports have been increasingly reliant on Eastern Asian products. For Sub-Saharan Africa, trade relations seem to increase in significance, especially due to energy-related imports, but also because of the general strong growth performance of this region in the last decade.

Besides the regional effects, the other variables also show the expected effects. Most interestingly, the Customs Union with the EU did not increase exports, and although its creation increased imports at first, these later fell - the effect described here is of course also driven by other forces, as it describes trade with the EU-15, dependent on the 1995 change. Therefore, it is difficult to argue for a clear relation between the CU and later negative effects in imports. The effect of the rejection of the Turkish EEC membership in 1989 seems limited to the immediately following years, then EU-Turkey relations normalized. This underlines the findings for the regional dummy variables, that although EU-Turkey relations have no special role, they are not negatively biased in the mid- or long-term.

---

[57] Interestingly, the current crisis within the region, e.g. in Egypt, Tunisia and Libya, is not reflected in the data. Its effects are only visible in individual, selected years, but trade quickly regains its former strength.
[58] See Polyakov (2001) for an extensive discussion.

With regard to the standard gravity variables, namely GDP and distance, the results are consistent with the theory. Turkish GDP has partially contradictory effects only in the 1969-80 time interval, which may be due to the intensive focus on an import-substitution led growth strategy. For the cultural dummies, we find that with the decline and finally the end of the hegemonial power of the Soviet Union in period (2), the dummy variable's sign changes to positive, with a delay for the common language dummy, which depends highly on Bulgarian-Turkish trade. This is consistent with the fact that Bulgaria faced difficulties until 1994, after which it started to recover from the structural change of its economy. Besides FTAs, preferential trade agreements became effective when trade started to play a more prominent role from the beginning of the 90s. Another factor is simply the increase over time in the number of preferential trade agreements in countries which are important for Turkish trade. FTAs have been especially useful for exports, in the first period with Syria and Jordan, and later with a wide range of new partners. Imports, however, are only increased due to FTAs in the last decade.

The relatively low effect for the OIC countries with positive effects on exports and negative effects on imports, underlines Turkey's general lack of trade with other Muslim countries, given the low incomes and limited range of product variety available in these countries. For the BSCE, which is one of the close-by regional cooperations, only for imports a significant effect and a change of sign is visible in the 3rd and 4th period. The dummy for Cyprus shows that the conflict between the two countries impacts heavily Turkish-Cypriot trade relations.

In addition to these aggregated trade flows, sectoral trade has the potential to allow diversification and highlight any substantial differences in the sectors for the changes of trade relations and flows. The economically and politically most important sectors for Turkish trade are Agriculture, Textiles and Footwear, Machines and Energy products. Table 4-3 displays the estimation results for these sectors for exports and imports, respectively.

Table 4-3: Turkish trade flows by sector (BACI data).

Dep. Var.	Exports (log)					Imports (log)				
Reg.	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Sector	TOTAL	AGR.	ENGY	MACH	TEXT	TOTAL	AGR.	ENGY	MACH	TEXT
lgdp_j	0.617***	0.655***	0.663***	0.585***	0.645***	0.977***	1.053***	1.041***	0.956***	1.014***
lgdp_i	0.781***	0.809***	1.057***	0.763***	0.764***	0.506***	0.424***	0.366***	0.511***	0.580***
Ldistw	-1.098***	-1.176***	-1.091***	-1.061***	-1.121***	-0.855***	-0.714***	-0.467***	-0.931***	-0.941***
s (Remoteness)	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000**	0.000***	0.000***
Contig	0.033***	0.137***	0.205***	0.080***	-0.115***	0.368***	0.626***	0.720***	0.290***	0.262***
d_turclang	0.047***	0.021	-0.115	0.055***	0.055***	0.337***	0.422***	-0.114	0.272***	0.648***
comlang_ethno	0.698***	0.776***	0.613***	0.580***	0.850***	1.915***	1.653***	1.277***	1.942***	2.021***
d_prefTRADEagr	-0.002	0.051***	0.064	-0.004	-0.026***	0.827***	0.560***	1.077***	0.865***	0.752***
d_FTAs_noCU	-0.026***	-0.070***	-0.122***	-0.018***	-0.004	-0.164***	-0.397***	-0.421***	-0.050***	-0.118***
d_EU_CU	0.072***	0.148***	-0.216**	0.057***	0.077***	0.111***	0.116***	0.213***	0.120***	-0.090***
d_OIC	0.179***	0.195***	0.233***	0.122***	0.246***	0.178***	-0.038*	-0.197**	0.199***	0.345***
d_BSEC	-0.190***	-0.396***	-0.444***	-0.180***	-0.108***	-0.911***	-0.760***	-0.223**	-0.900***	-1.023***
d_noEUmem1989	0.354***	0.352***	0.321***	0.322***	0.415***	-0.158***	-0.470***	-0.605***	-0.056***	-0.083***
d_CYP	-5.969***	-6.082***	-5.736***	-5.887***	-6.089***	-7.269***	-7.213***	-3.625***	-7.318***	-7.586***
d_Russia	0.168***	0.280***	0.787***	0.195***	-0.013	1.937***	2.263***	1.974***	1.922***	1.729***
d_memberEU27	0.003	-0.133***	0.677***	0.112***	-0.209***	0.410***	0.935***	1.731***	0.336***	0.128***
d_NorthAfrica	0.477***	0.363***	0.848***	0.566***	0.320***	0.195***	0.772***	2.530***	0.173***	-0.338***
d_MiddleEast	0.294***	0.159***	0.781***	0.407***	0.079***	-0.017	0.634***	1.827***	-0.155***	-0.512***
d_CentralAsia	0.869***	0.978***	1.589***	0.861***	0.703***	1.306***	1.849***	3.240***	1.307***	0.795***
d_Caucasus	0.943***	1.094***	1.704***	0.900***	0.899***	1.972***	2.301***	3.103***	1.996***	1.514***
d_NorthAmerica	-0.535***	-0.346***	-0.288*	-0.655***	-0.529***	-0.453***	-0.464***	-0.034	-0.280***	-0.777***
d_LatinAmerica	-0.382***	-0.456***	-0.084	-0.358***	-0.474***	-0.746***	-0.124***	-0.327*	-0.806***	-0.975***
d_SouthAsia	-0.178***	-0.294***	0.190	-0.068***	-0.408***	-0.711***	-0.285***	-0.082	-0.726***	-0.882***
d_EasternAsia	-0.090***	-0.252***	0.048	0.042***	-0.268***	0.073***	0.491***	0.486***	0.216***	-0.179***
d_SubSaharanAfrica	-0.124***	-0.247***	0.344***	-0.063***	-0.222***	0.449***	0.399***	1.659***	0.962***	-0.298***
d_EuropeNot27	0.016***	-0.060***	0.743***	0.075***	-0.184***	0.765***	1.447***	1.806***	0.574***	0.339***
Constant	-8.99***	-9.98***	-18.08***	-8.06***	-8.91***	-12.47***	-13.68***	-14.45***	-11.49***	-14.44***
Observations	1,589,730	136,557	4,768	372,844	408,501	973,141	58,367	5,030	246,309	176,679
R-squared (adj.)	0.893	0.898	0.886	0.890	0.897	0.874	0.875	0.852	0.865	0.894
Robust pval in brackets, *** p<0.01, ** p<0.05, * p<0.1										

Sectoral trade is based on the BACI data, and includes much more trade flow data due to the changed level of aggregation. For aggregated trade from 1994 to 2012 we find a slightly different result: With the increased explanatory power of the aggregated BACI data, see the adjusted R-squared, the effects are similar in its direction but lower, and the membership of the EU is not significant. Thus, EU-Turkish trade seems explainable by the gravity model including variables of RCs and BTCs –and there is no evidence for "turning away from the West". The other neighboring regions' coefficients also decrease, but the effect remains positive and significant.

The differences in sectoral trade are not as prominent as expected. Interestingly, the sectoral trade analysis for the EU-27 shows significant negative effects for the agricultural products and textiles. Although Erdem and Nazlioglu (2008) find the membership in the EU-Turkey Customs Union Agreement positively correlated to agricultural trade, we cannot confirm these findings (for 1996-2004). Thus, despite the generally close trade relations, the EU-protection in this area remains strong. The asymmetric EU effect in the trade relations becomes visible in the import flows, as there is no negative coefficient here. Thus, even for those products which are particularly associated with Turkey, Turkey's market is more open to European imports than vice versa. For the other neighboring regions the effects are all positive, thus trade is positively affected by regional membership independent of the kind of product traded. For the Middle East, also, the import structure is unanimous, while for the remaining regions, the effects are significant, but negative. With regard to the previous estimation results, this is only surprising for Sub-Saharan Africa.

With regard to trade cost variables, most remain stable and are in line with theory. Only the FTAs were significant, but negative, which is unexpected as FTAs usually lead to higher trade. This issue may be resolved by a separate analysis of Turkish trade agreements and its effects. Furthermore, the BSCE variable is negative and significant. As the effect is still in a reasonable range, this could be due to the fact that most of the trade is explained by the GDP growth and the positive contiguity variable – leaving the regional trade dummy with the low but negative side effects, such as tensions between Turkey and Armenia.

4.3. Concluding remarks

Turkey has emerged as regional power and has consolidated its position regarding all neighboring regions. While trade with the EU remains high, its relative importance declines due to a rising orientation towards emerging regions, such as the CIS states and the Caucasus region. Membership of the two remaining neighboring regions, North Africa and the Middle East, also affects Turkish trade positively. Nevertheless, the argument that Turkey is turning away from the West is not wholly justified, as the diversification of trade patterns has not led to a decline in relation with the EU, or the Western world in general. It is nevertheless important to highlight that the EU has to some extent lost its favorable trade position with Turkey due to fluctuations in bilateral relations. We find Turkish export sectors such as agriculture or textiles negatively affected by the EU-Turkish customs union, which also suggests that the unequal effects of trade agreements (biased against Turkey) may have influenced Turkey's turn away.

We apply Least Square Dummy Variable (LSDV) estimation with two different datasets. While our approach allows the discussion of changes due to known gravity variables and regional and bilateral trade cost dummies, it is quite robust to the inclusion or exclusion of explicatory variables. Nevertheless, the heavy reliance on dummies in gravity model analysis is a clear limit of this approach. With regard to data, IMF's DOTS and CEPII's BACI database show trends which are generally similar overall, but differ significantly in details. Obviously, all trade analysis is only as good as its underlying data. Therefore, a robustness check with another database seems to be an important add-on for existing and future research, e.g. with a focus on effects of one trade agreement.

For Turkey, recommendations on future positioning could be to include in its spectrum South America, where trade levels are below even those predicted by the gravity model, due to economic size and distance. Furthermore, there seems to be unequal benefits from EU-Turkey trade agreements. Thus, while acknowledging the strategic importance of the EU as its main trading partner, Turkey should continue to press for greater benefits in future agreements. All together, the regional positioning seems to work well – all neighboring regions have positive coefficients for its members. Only the Cyprus conflict has a severe, negative impact on the respective trade relations, and some other country effects will be hidden by a general positive regional effect. Thus, Turkey could increase its gains by settling these conflicts.

For future research, a more-in-depth analysis of regional effects may be useful. Membership of some regions with increasing geostrategic importance for Turkey, such as the Middle East, had partly negative effects on Turkish trade. This is due to different approaches towards individual countries in the region taken by the Turkish government. It would be interesting to cluster the regions in different countries to detect winner-clusters, and thus draw possible inferences for sub-regional effects. In addition, a check with a second trade database could be interesting for several trade related papers, especially when trade flows are the only difference.

In conclusion, we can state that for Turkey, the results are optimistic, as its trade patterns show special relations with all neighboring regions. This could lead to the position of a regional bridge-builder, with balanced relations in the greater region including Europe, Africa, the Middle East and Western Asia (Russia, Caucasus, and Central Asia). Trade with Turkey underlines the increasing momentum of the emerging neighboring regions. While this increasing importance cannot be denied, this does not mean a decrease in absolute terms of the importance of trade and political relations with the EU or the "West" in general; rather it reflects a more diversified and relative view of economic and political attraction, due to developing trade patterns.

4.4. Appendix to essay 3

4.4.1. Detailed description of variables

lexport / limport	trade flows in log
gdp_i / gdp_j	gdp in log for origin (i=Turkey) and its trade partners (j=destinations). GDP is in nominal terms – as trade flows are also displayed in nominal terms and we account for changing prices with time effects (Baldwin and Taglioni, 2006).
ldistw	log of distance: inter-city distance weighted by the population share of these cities. The measure has been developed by Head and Mayer (2002): $$d_{ij} = \sum_{k \in i} \frac{pop_k}{pop_i} \sum_{l \in j} \frac{pop_l}{pop_j} d_{kl}$$ pop(k) = population of agglomeration k belonging to country i pop(l) = population of agglomeration l belonging to country j d(kl) = distance of the cities
s (Remoteness_head2003)	Frequently used to control for the multilateral resistance terms for exporting and importing countries, established by Head (2003): REM_head2003 for country i: $$REM_i = \sum_i \frac{dist_i}{GDP_i / GDP_w}$$ Measure for remoteness approaching the multilateral resistance which is also covered within the year and the regional fixed effects (as we have regions, we do not apply the country fixed effects and use the LSDV regression)
fe_y*	Fixed effects for each year from 1960-2012
contig	9 neighboring countries: Armenia, Azerbaijan, Bulgaria, Georgia, Greece, Iran, Iraq, Syria
d_turclang	6 Turkish-speaking countries: Azerbaijan, Cyprus, Kazakhstan, Uzbekistan, Tajikistan, Turkmenistan
comlang_ethno	Languages (mother tongue, lingua francas or second languages) spoken by at least 20% of the population of the countries: only Cyprus and Bulgaria
dprefTRADEagr	Preferential trade agreements except FTAs and CU with EU: Indonesia (1959), Pakistan (1965), China (1974), Afghanistan, Bulgaria (1976), Korea, Malaysia (1977), India (1978), Qatar (1985), Thailand (1987), Australia (1988), Lebanon, Russia, Yemen (1991), Argentina, Ukraine (1992), Montenegro (1993), Moldova (1994), Brazil, Philippines (1995), Kirgizstan (1997), Mexico (1998), Oman (2004), Columbia (2006), Uruguay (2009)
d_FTAs_noCU	All FTAs except the CU: Syria (1972), Jordan (1980), Switzerland, Norway, Island, Liechtenstein, Finland, Lebanon (1991), Tunisia (1992), Israel (1996), Macedonia (1999), Bosnia-Herzegovina and Croatia (2002), South Africa, Morocco, Palestine (2004); Egypt (2005), Albania (2006), Georgia (2007), Montenegro (2008), Chile and Serbia (2009), Korea (2010), Mauritius (2011)
dummyEU_CU	Customs Union with EU in 1995 (with new members in the following years due to enlargements)
d_OIC	Organization of Islamic states (Since 1969: Afghanistan, Algeria, Chad, Egypt, Guinea, Indonesia, Iran, Jordan, Kuwait, Lebanon, Libya, Mali, Malaysia, Mauritania, Morocco,

	Niger, Pakistan, Saudi Arabia, Senegal, Sudan, Somalia, Tunisia, Yemen, Malaya; since 1970: Bahrain, Oman, Qatar, Syria; since 1971: United Arabic Emirates, since 1972: Sierra Leone, since 1974: Bangladesh, Gabon, Gambia, Guinea-Bissau, Uganda; since 1975: Burkina Faso, Cameroon; since 1976: Comoros, Iraq, Maldives, since 1978: Djibouti, since 1982: Benin; since 1984: Brunei, since 1986: Nigeria; since 1991: Azerbaijan; since 1992: Albania, Kirgizstan, Tajikistan, Turkmenistan; since 1994: Mozambique; since 1995: Kazakhstan, Uzbekistan; since 1996: Surinam; since 1997: Togo; since 1998: Guyana; since 2001: Cote d'Ivoire)
d_BSEC	Organization of the Black Sea Economic Cooperation (Greece, Bulgaria, Romania, Moldova, Ukraine, Albania, Russia, Armenia, Azerbaijan, Georgia, Serbia, Montenegro)
dummy_noEUmem1989	Rejection of Turkish accession to EU and its effect on the EU-15 countries from 1990-2012
d_CYP	Dummy for the Turkey-Cyprus political tensions, starting with the Turkish military operation in 1974, thus, the dummy is 1 for 1974-2012.
Regions	
d_Russia	Russian Federation (including historic trade for U.S.S.R.) (1 country)
d_memberEU27	Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom (27 countries)
d_NorthAfrica	Algeria, Egypt, Libya, Morocco, Tunisia (5 countries)
d_MiddleEast	Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Yemen, United Arabic Emirates (14 countries)
d_CentralAsia	Kazakhstan, Kirgizstan, Tajikistan, Turkmenistan, Uzbekistan (5 countries)
d_Caucasus	Armenia, Azerbaijan, Georgia (3 countries)
d_NorthAmerica	Canada, United States of America (2 countries)
d_LatinAmerica	Argentina, Brazil, Paraguay, Uruguay, Venezuela, Chile, Bolivia, Peru, Ecuador, Columbia, Mexico, Cuba, Dominican Republic, Costa Rica, Salvador, Guatemala, Haiti, Honduras, Nicaragua, Panama, Puerto Rico (21 countries)
d_SouthAsia	Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan, Maldives, Sri Lanka (8 countries)
d_EasternAsia	Cambodia, China, Indonesia, Japan, Cook Islands, Fiji, Kiribati, Republic of Korea, Marshall Islands, Federated States of Micronesia, Mongolia, Vanuatu, Nauru, Niue, Palau, Papua New Guinea, Western Samoa, Solomon Islands, Tonga, Tuvalu, Laos, Malaysia, Myanmar, Philippines, Thailand, Singapore, Vietnam (28 countries)
d_SubSaharanAfrica	Angola, Burundi, Botswana, Burkina Faso, Benin, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, D.R. Congo, Republic of Congo, Cote d'Ivoire, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe, Ghana, Western Sahara (48 countries)
d_EuropeNot27	Albania, Belarus, Bosnia-Herzegovina, Croatia, Iceland, Kosovo, Macedonia, Moldova, Montenegro, Norway, Switzerland, Ukraine (including historic data for Yugoslavia) (12 countries)

4.4.2. Development of Turkish trade from 1923 till today

Introduction

The following three appendices provide a detailed descriptive analysis of Turkish trade. While this appendix 4.4.2 describes the history of Turkish trade, the appendix 4.4.3 and 4.4.4 show the changing patterns in Turkish trade with regard to concentration and relative changes to individual countries.

In general, we find that the actual structure with regard to the ten major trading partners remains stable, thus these accumulated shares do not change much – and we get the same results for the 50 and 90 major trading partners. But when we analyze trade shares from 1996 to 2012 for world regions and regional organizations we find a clear change. Turkish trade diversifies in total trade, imports and exports. The most prominent changes are the loss of shares by Western countries and the increase in shares for the Near and Middle East (also OIC and EOC), South East Asia and China (Other Asian Countries). While it could be expected that the Asian countries would increase prominently with regard to import shares, the substantial rise in Turkish export shares for the Near- and Middle-East, OIC and EOC is more a surprise. The Turkish economy is growing and needs resources, thus, the increase in imports from the OIC relies heavily on oil and gas, but the increase of the export share proves the emergence of a new market for Turkish products. With regard to the Turkish trade structure, the sustainability of the trade patterns is problematic, as structural problems such as the trade deficit require adequate responses in the economic policy.

The organization of this appendix is as follows. The next subsection will provide an overview of the history of Turkish trade openness. Next, the Turkish trade patterns and their changes are discussed. The following subsection describes the status quo in detail while the next subsection describes the trade patterns of Turkey with different concentration measures and by regions, country clusters and individual countries. The final section discusses changes in trade relations of Turkey.

The openness history of Turkey: trade on the rise[59]

Since the foundation of the Turkish Republic in 1923, foreign trade policy can be divided into six sub-periods which result from structural breaks in foreign trade policies. They are displayed in Table 4-4: and will be explained in the following section.[60]

Table 4-4: Periods in Turkish trade policy

Period	Name
1923-1929	Establishment Period
1930-1950	Protectionist Era
1950-1962	Partial Liberalization
1963-1980	Planned Economy
1980-1995	Export Promoted Development
1995 onwards	Accession to CU and towards integration with EU

Establishment Period: 1923-1929

The structure of foreign trade in this period was under the influence of the economic and social structure taken over from the Ottoman Empire. Just before its collapse, the Empire exported raw materials and agricultural products and imported manufactured goods. In addition, all transportation channels belonged to foreign firms and the economy was in recession. The table below shows Turkish foreign trade during 1923-1929.

---

[59] This subsection has been written by Professor Yetkiner who draws heavily from a masters' thesis (Bilici 2009), which was conducted under his supervision.

[60] This classification is a very common and well accepted one in the literature (see Seymen, 2009).

Table 4-5: Turkish foreign trade: period 1923-1929

Years	Export		Import		Volume of Foreign Trade		X/(X+M)	M/(X+M)	Balance of Foreign Trade	Imports Covered by Exports
	Value million$	Change %	Value million$	Change %	Value million$	Change %	%	%	Value million$	%
1923	50.8	-	86.9	-	137.7	-	36.9	63.1	-36.1	58.5
1924	82.4	62.3	100.5	15.6	182.9	32.8	45.1	54.9	-18.0	82.1
1925	102.7	24.6	129.0	28.4	231.7	26.7	44.3	55.7	-26.3	79.6
1926	96.4	-6.1	121.4	-5.8	217.8	-6.0	44.3	55.7	-25.0	79.4
1927	80.7	-16.3	107.8	-11.3	188.5	-13.5	42.8	57.2	-27.0	74.9
1928	88.3	9.3	113.7	5.5	202.0	7.2	43.7	56.3	-25.4	77.6
1929	74.8	-15.2	123.6	8.7	198.4	-1.8	37.7	62.3	-48.7	60.6

Source: Turkish Statistical Institute.

Note: X/(X+M) and M/(X+M) indicate export share and import share in total trade flows, respectively.

Table 4-5 indicates that Turkey's exports and imports, and hence total trade, have increased from 1923 to 1929. But in 1926 and 1927, both of them decreased, as Turkey suffered from an extraordinary drought. In these years, 75% of export income was due to five agricultural products (tobacco, cotton, hazelnut, raisin and dry fig) and the drought-related decrease in agricultural production of nearly 30% can be seen in the data. The trade deficit also increased in absolute value in these years. While the share of exports in total trade increased and the share of imports slightly decreased, the share of imports in total trade was higher than the export share during this period. The increasing trend of imports was the result of the Treaty of Lausanne, which proposed low tariff rates and a lowering of trade restrictions. The increasing imports triggered the trade deficit, which was the main reason for the devaluation of the Turkish Lira in this period. Moreover, the last year of this period was the first year of the Great Depression. All these reasons have caused structural changes in foreign trade policy (Tezel, 1994: 110).

Protectionist Era: 1930-1950

Turkey started to follow an interventionist foreign trade policy (as well as the general economic policy) after 1929. The main characteristic of this period was a rise in the domestic manufacturing industry. To this end, customs tariffs and foreign exchanges were regulated and direct restrictions were applied on imports (Alpar, 1974: 62).

Table 4-6: Turkish foreign trade: period 1930-1950

Years	Export		Import		Volume of Foreign Trade		X/(X+M)	M/(X+M)	Balance of Foreign Trade	Imports Covered by Exports
	Value million$	Change %	Value million$	Change %	Value million$	Change %	%	%	Value million$	%
1929	74.8	-15.2	123.6	8.7	198.4	-1.8	37.7	62.3	-48.7	60.6
1930	71.4	-4.6	69.5	-43.7	140.9	-29.0	50.7	49.3	1.8	102.6
1931	60.2	-15.6	59.9	-13.8	120.2	-14.7	50.1	49.8	0.3	100.5
1932	48	-20.3	40.7	-32.1	88.7	-26.2	54.1	45.9	7.3	117.8
1933	58.1	21	45.1	10.7	103.2	16.3	56.3	43.7	13	128.8
1934	73	25.7	68.8	52.5	141.8	37.4	51.5	48.5	4.2	106.2
1935	76.2	4.4	70.6	2.7	146.9	3.6	51.9	48.1	5.6	107.9
1936	93.7	22.9	73.6	4.2	167.3	13.9	56.0	44.0	20.1	127.2
1937	109.2	16.6	90.5	23	199.8	19.4	54.7	45.3	18.7	120.6
1938	115	5.3	118.9	31.3	233.9	17.1	49.2	50.8	-3.9	96.7
1939	99.6	-13.4	92.5	-22.2	192.1	-17.9	51.8	48.2	7.1	107.7
1940	80.9	-18.8	50	-45.9	130.9	-31.9	61.8	38.2	30.9	161.7
1941	91.1	12.5	55.3	10.6	146.4	11.8	62.2	37.8	35.7	164.5
1942	126.1	38.5	112.9	103.9	239	63.3	52.8	47.2	13.2	111.7
1943	196.7	56	155.3	37.6	352.1	47.3	55.9	44.1	41.4	126.6
1944	178	-9.5	126.2	-18.7	304.2	-13.6	58.5	41.5	51.7	141
1945	168.3	-5.4	97	-23.2	265.2	-12.8	63.5	36.6	71.3	173.5
1946	214.6	27.5	118.9	22.6	333.5	25.8	64.3	35.7	95.7	180.5
1947	223.3	4.1	244.6	105.8	467.9	40.3	47.7	52.3	-21.3	91.3
1948	196.8	-11.9	275.1	12.4	471.9	0.9	41.7	58.3	-78.3	71.5
1949	247.8	25.9	290.2	5.5	538	14.0	46.1	53.9	-42.4	85.4
1950	263.4	6.3	285.7	-1.6	549.1	2.1	48.0	52.0	-22.2	92.2

Source: Turkish Statistical Institute.

Due to the 1929 crisis and increasing tariffs, exports and imports decreased, as shown in Table 4-6. These decreases continued until 1932. To minimize the effects of the crisis, currency controls and import restrictions were applied in this period. Thus, foreign trade between 1930 and 1938 was lower than foreign trade between 1923 and 1929 (Pekin and Ergun, 1984: 2). The most important aspect of this period was that the trade balance was positive in almost all respective years. This was the result of significant increases in exports and decreases in imports. There were several reasons

behind increasing exports. First, rich harvests increased the export value in the agricultural sector. Second, there was increasing demand for agricultural and mining products by Germany due to its expansionary policies in the Balkans and Middle East, mostly driven by the new Nazi government. Furthermore, Turkey established bilateral trade agreements in order to cover increasing import demand and accumulate gold and foreign exchange reserves for the Central Bank. In addition to this, the government paid back its debts to the Soviet Union and the UK via exports. However, World War II stopped the rise in Turkish exports. In 1946, the government decided to devaluate the Turkish Lira in order to ease its hand for redemption of foreign debts. But, in spite of the devaluation, imports kept increasing and exports decreasing. Therefore in 1948, the trade deficit increased to 78.3 million dollars. The failure of the devaluation can be explained by the inelastic supply of export goods and inelastic demand of import goods (Pekin and Ergun, 1984:4).

Partial Liberalization: 1950-1962

1950 was a milestone in terms of foreign trade policies. In 1950, the European Payments Union (EPU) was established, whose members decided to remove import restrictions against each other by guaranteeing the convertibility of their currencies. Turkey decided to abide by the "list of free import goods" created by the EPU. At that time, 60 percent of imports were liberalized (Karluk, 1984: 62). Nevertheless, these liberalization policies caused a decrease in foreign exchange reserves due to increases in import demand. So, the list was first shortened and in 1955 entirely abolished. The second half of the 1950s represent the inflationary years resulting from increasing budget deficits. Moreover, the restrictions on imports caused deficits in the supply of investment and intermediate goods used by domestic industries. This increased inflation. Due to the internal and external instabilities, a stability program monitored by the Organization for European Economic Cooperation (OEEC), the International Monetary Fund (IMF) and the US Government was initiated in 1958. In accordance with this program, import quotas were extended and additional quotas were created (Alpar, 1974: 54-65).

Table 4-7 below shows the trade progress of Turkey under the main events mentioned above. The balance of foreign trade was in deficit in all these years. Due to liberal trade policies, imports increased until 1953. But decreases in the foreign exchange reserves required setting restrictions on imports. The decline in imports between 1953 and 1958 was the result of these restrictions.

Table 4-7: Turkish foreign trade: period 1950-1962

Years	Export		Import		Volume of Foreign Trade		X/(X+M)	M/(X+M)	Balance of Foreign Trade	Imports Covered by Exports
	Value million$	Change %	Value million$	Change %	Value million$	Change %	%	%	Value million$	%
1950	263.4	6.3	285.7	-1.6	549.1	2.1	48.0	52.0	-22.2	92.2
1951	314.1	19.2	402.1	40.8	716.2	30.4	43.9	56.1	-88	78.1
1952	362.9	15.5	555.9	38.3	918.8	28.3	39.5	60.5	-193	65.3
1953	396.1	9.1	532.5	-4.2	928.6	1.1	42.7	57.3	-136.5	74.4
1954	334.9	-15.4	478.4	-10.2	813.3	-12.4	41.2	58.8	-143.4	70
1955	313.3	-6.4	497.6	4	811	-0.3	38.6	61.4	-184.3	63
1956	305	-2.7	407.3	-18.1	712.3	-12.2	42.8	57.2	-102.4	74.9
1957	345.2	13.2	397.1	-2.5	742.3	4.2	46.5	53.5	-51.9	86.9
1958	247.3	-28.4	315.1	-20.7	562.4	-24.2	44.0	56.0	-67.8	78.5
1959	353.8	43.1	470	49.2	823.8	46.5	42.9	57.1	-116.2	75.3
1960	320.7	-9.3	468.2	-0.4	788.9	-4.2	40.7	59.3	-147.5	68.5
1961	346.7	8.1	507.2	8.3	853.9	8.2	40.6	59.4	-160.5	68.4
1962	381.2	9.9	619.4	22.1	1000.6	17.2	38.1	61.9	-238.3	61.5

Source: Turkish Statistical Institute.

Planned Economy: 1963-1980

After the 1960s, there were radical changes in Turkey's macroeconomic policies in general and in foreign trade policies, in particular. 1963-1980 was the planned economy period. In this period, the economy was controlled by five-year development plans. All plans that came into force in this period were based on import substitution strategies. The main elements of these plans concerning foreign trade were as follows:

First Five-Year Development Plan: The general idea of this plan was protectionism in foreign trade policy. The purpose of the protectionism was to protect potential industries and to obtain international competitiveness (Alpar, 1974: 73). An important advance in progress during this period was the Association Agreement with the European Economic Community (EEC).

Second Five-Year Development Plan: The aim of this plan was to protect new industries. To this end, a number of restrictions implemented on imports had been increased (relative to the first plan). But the temporariness of these restrictions had been stated in the plan and the first stage of import

118

substitution strategy had covered the non-durable goods. In the middle of the 1960s, domestic production of nondurable goods became sufficient for domestic demand as expected. The second stage of import substitution strategy suggested protection of domestic production of intermediate and investment goods. As a result, exports of manufactured goods were ignored. But these industries were high technology, skilled labor and capital intensive industries. So the second stage of the strategy failed. Failure of this stage led to development of an assembly industry, which increased foreign exchange demand, rather than the predicted growth of Turkish industries (Serin, 1981: 389).

Third Five-Year Development Plan: According to this plan, Turkey's industrialization was compulsory in terms of decreasing the country's dependence on foreign resources. However, what was implied here was not the creation of a self-sufficient autarkic structure. In contrast, it was stated in the plan that liberal foreign policies are required to obtain international competitive power. The reason for following liberal policies was not only the belief that such policies could create an internationally competitive trade structure but also the effort to provide convenient trade policies with the EEC. Indeed, the third plan period overlapped with the transition period of the Turkey-EEC Association Agreement, which had put restrictions on protective trade policies.

Fourth Five-Year Development Plan: To produce investment goods and intermediate goods through the manufacturing industry and to form a competitive industrial structure were two main aims of the fourth five-year development plan. Similar to previous planning periods, it was expressed that young industries would be protected and consumption of luxury goods would be controlled during this planning period. As industrialization and foreign trade policies had to be run simultaneously and conveniently with each other, bureaucratic delays were eliminated and exports of industrial products were promoted. Table 4-8 indicates the pattern of foreign trade of Turkey during this time period:

Table 4-8: Turkish foreign trade: period 1963-1980

Years	Export		Import		Volume of Foreign Trade		X/(X+M)	M/(X+M)	Balance of Foreign Trade	Imports Covered by Exports
	Value million$	Change %	Value million$	Change %	Value million$	Change %	%	%	Value million$	%
1962	381.2	9.9	619.4	22.1	1000.6	17.2	38.1	61.9	-238.3	61.5
1963	368.1	-3.4	687.6	11	1055.7	5.5	34.9	65.1	-319.5	53.5
1964	410.8	11.6	537.2	-21.9	948	-10.2	43.3	56.7	-126.5	76.5
1965	463.7	12.9	572	6.5	1035.7	9.3	44.8	55.2	-108.2	81.1
1966	490.5	5.8	718.3	25.6	1208.8	16.7	40.6	59.4	-227.8	68.3
1967	522.3	6.5	684.7	-4.7	1207	-0.1	43.3	56.7	-162.3	76.3
1968	496.4	-5	763.7	11.5	1260.1	4.4	39.4	60.6	-267.2	65
1969	536.8	8.1	801.2	4.9	1338.1	6.2	40.1	59.9	-264.4	67
1970	588.5	9.6	947.6	18.3	1536.1	14.8	38.3	61.7	-359.1	62.1
1971	676.6	15	1170.8	23.6	1847.4	20.3	36.6	63.4	-494.2	57.8
1972	885	30.8	1562.5	33.5	2447.5	32.5	36.2	63.8	-677.6	56.6
1973	1317.1	48.8	2086.2	33.5	3403.3	39.1	38.7	61.3	-769.1	63.1
1974	1532.2	16.3	3777.5	81.1	5309.7	56.0	28.9	71.1	-2245.3	40.6
1975	1401.1	-8.6	4738.6	25.4	6139.6	15.6	22.8	77.2	-3337.5	29.6
1976	1960.2	39.9	5128.6	8.2	7088.9	15.5	27.7	72.3	-3168.4	38.2
1977	1753	-10.6	5796.3	13	7549.3	6.5	23.2	76.8	-4043.3	30.2
1978	2288.2	30.5	4599	-20.7	6887.2	-8.8	33.2	66.8	-2310.9	49.8
1979	2261.2	-1.2	5069.4	10.2	7330.6	6.4	30.8	69.2	-2808.2	44.6
1980	2910.1	28.7	7909.4	56	10819.5	47.6	26.9	73.1	-4999.2	36.8

Source: Turkish Statistical Institute.

According to the table above, the balance of foreign trade yields deficits in all years because during this period the rate of increase in imports was higher than the rate of increase in exports. In order to invoke investments required for development, import was inevitable. The total trade volume increased in all years except 1964, 1967 and 1978. The increase in total trade was characteristic for the third five-year plan.

During the first plan period, exports were more stable than imports. Imports were realized at the predicted values during this plan and exports even exceeded the predicted values by 8%. The increase in exports was due to unexpected increases in agricultural products. Although exports were

realized more than expected, there were no structural changes in export goods. The share of industrial goods exported was lower than the share of agricultural goods exported throughout the five years (Seymen, 2009: 20). During the first five years, exports increased by 38%.

In the second plan period, imports increased by 178%. They had an increasing trend in all years and exceeded again the predicted values. The unexpected increases in remittances provided a payment facility for imported goods. Furthermore, due to the supply deficit in raw materials and the oil crisis, prices increased and caused an increase in payments of imports. Additionally, domestic economic conditions such as inflation, price policy and overvalued TL stimulated imports as well (Pekin and Ergun, 1984: 7). During this period, exports increased due to export incentives and the 1970 devaluation. But world economic conditions (oil crisis and supply deficit) and domestic economic conditions (fixed exchange rates, increasing domestic demand and insufficient production) decreased the amount of exportable goods.

The third five-year plan covers the period from 1973 to 1977. At the beginning of this period, exports increased due to the long-term effect of the 1970 devaluation. There were many factors that caused the decrease in exports in 1975. These were expansive domestic demand stemming from inflationist policies, higher domestic prices than world prices, and overvalued TL due to fixed exchange rates. In addition, recession in the world economy caused decreases in exports, which was partly due to the oil crisis in 1973. Furthermore, the embargo imposed on Turkey by the US due to the Cyprus Operation, the Turkish invasion of Cyprus, affected Turkey's foreign trade negatively in this period. At the end of the 1970s, the deficit in the balance of payment increased further. The lack of foreign exchange reserves slowed down domestic production. Consequently, economic and political instability increased.

The third plan was implemented in 1978-1983. Although there was a decrease in imports by 20% in 1978, they increased again by 56% between 1979 and 1980. This increase was the result of high prices on imported goods. Due to economic and political crises in Turkey, exports decreased in 1979 (Pekin and Ergun, 1984: 12). Despite the planning period from 1978 till 1983, the plan was suspended after the 24th January 1980 decrees –and Turkish trade policy shifted to an export-promotion strategy.

Export Promoted Development: 1980-1995

1980 was the turning point for the Turkish economy and its foreign trade policies. Following the world recession, there was a slowdown in the Turkish economy. To overcome these problems, a stabilization package known as 'January 24 1980 Decrees' was put into force. These decrees aimed at and led to structural changes in the economy. There were two main purposes in this package. First, a free price mechanism aimed to replace centralized price determination in the goods market. Second, the development strategy was changed. The export-promotion development strategy replaced the import-substitution development strategy. To achieve these aims, a new price policy was adopted instead of price control policies. Liberal policies in foreign trade, currency policy and a foreign exchange regime were introduced (Krueger, 1992: 41-45). Within the framework of the January 24 Decrees, a devaluation was implemented and the value of the TL decreased by 49% against the US dollar. The aim of this devaluation was to accelerate exports by decreasing domestic demand. In this context, a flexible exchange rate regime was introduced. Various incentives such as tax refund, dispensation of income tax and customs duties and currency allocations were provided to increase exports. By liberal trade policies and export incentives, trade flows exhibited a change in both volume and structure. Table 4-9 shows the progress of foreign trade during 1980-1994.

Table 4-9: Turkish foreign trade: period 1980-1994

Years	Export		Import		Volume of Foreign Trade		X/(X+M)	M/(X+M)	Balance of Foreign Trade	Imports Covered by Exports
	Value million$	Change %	Value million$	Change %	Value million$	Change %	%	%	Value million$	%
1979	2261.2	-1.2	5069.4	10.2	7330.6	6.4	30.8	69.2	-2808.2	44.6
1980	2910.1	28.7	7909.4	56	10819.5	47.6	26.9	73.1	-4999.2	36.8
1981	4702.9	61.6	8933.4	12.9	13636.3	26.0	34.5	65.5	-4230.4	52.6
1982	5746	22.2	8842.7	-1	14588.6	7.0	39.4	60.6	-3096.7	65
1983	5727.8	-0.3	9235	4.4	14962.8	2.6	38.3	61.7	-3507.2	62
1984	7133.6	24.5	10757	16.5	17890.6	19.6	39.9	60.1	-3623.4	66.3
1985	7958	11.6	11343.4	5.5	19301.4	7.9	41.2	58.8	-3385.4	70.2
1986	7456.7	-6.3	11104.8	-2.1	18561.5	-3.8	40.2	59.8	-3648	67.1
1987	10190	36.7	14157.8	27.5	24347.9	31.2	41.9	58.1	-3967.8	72
1988	11662	14.4	14335.4	1.3	25997.4	6.8	44.9	55.1	-2673.4	81.4
1989	11624.7	-0.3	15792.1	10.2	27416.8	5.5	42.4	57.6	-4167.5	73.6
1990	12959.3	11.5	22302.1	41.2	35261.4	28.6	36.8	63.2	-9342.8	58.1
1991	13593.5	4.9	21047	-5.6	34640.5	-1.8	39.2	60.8	-7453.6	64.6
1992	14714.6	8.2	22871.1	8.7	37585.7	8.5	39.1	60.9	-8156.4	64.3
1993	15345.1	4.3	29428.4	28.7	44773.4	19.1	34.3	65.7	-14083.	52.1
1994	18105.9	18	23270	-20.9	41375.9	-7.6	43.8	56.2	-5164.1	77.8
1995	21637	19.5	35709	53.5	57346.1	38.6	37.7	62.3	-14072	60.6

Source: Turkish Statistical Institute.

At the beginning of this period, the trade deficit decreased mainly as a result of increasing exports and devaluation. Consequently, there was a decrease in the trade deficit by 15%, despite an increase of 26% in total trade volume in 1981. Moreover, the predicted trade deficit was 5.5 billion dollars in the 1981 program but only 4.2 billion dollars were realized (Pekin and Ergun, 1984: 9). Exports increased from 2.9 billion dollars to 21.6 billion dollars from 1980 to 1995. But this increasing trend decreased due to the low growth and recession period in developed countries, especially in Europe. The share of agricultural goods decreased and the share of industrial goods increased from 36% to 80% (Seymen, 2009: 27).

World economic conditions (recession and Gulf crisis) and domestic economic conditions (high inflation rates, budget deficit and increasing internal and external debts) at the beginning of the

1990s caused the economic crisis in 1994. As a result of this crisis, the April 5 Decrees came into effect. The most important element of these decrees was the devaluation of the TL by nearly 40% against the US dollar. Subsequent to this devaluation, exports increased by 18% and 19.5% in 1994 and 1995 respectively. The main aim of this period was to increase exports. However, the export share in total trade flows was always below the import share in total trade flows.

<u>Accession to CU and towards integration with EU: 1995 onwards</u>

In Turkey's foreign trade, one could describe the time after 1995 as the period during which the dependency on international legal rules increased, and applications and legislation regulations were performed in the light of international norms. Consequently the globalization phenomenon was increasingly felt in terms of foreign trade. During this period, one of the two aspects taken into account while determining the foreign trade policy was the WTO establishment agreement which came into force on January 1, 1995. The second was the initiation of a Customs Union with the EU, which came into effect on January 1, 1996.

Table 4-10 presents trade indicators of Turkey from 1995 onwards. According to the table, exports of Turkey increased from 1995 to 2012 except for 1999 and 2009. In 1999, a strong earthquake hit Turkey and 2009 was the year of global recession due to a financial crisis mainly in the USA and Europe. There is no certain effect of the CU agreement on both export and import flows. However, in 1996, the rate of imports covered by exports was 53%. This rate reached its minimum value in 2000. But after the 2001 crisis, due to the high rate of devaluation, this rate reached a maximum of 75.7%. In this period, the trade balance was in deficit. In 2012, the trade deficit reached 84 billion dollars.

Table 4-10: Turkish foreign trade: period 1995-2012

Years	Export		Import		Volume of Foreign Trade		X/ (X+M)	M/ (X+M)	Balance of Foreign Trade	Imports Covered by Exports
	Value mil$	Chan. %	Value mil$	Chan %	Value mill$	Chan. %	%	%	Value mil$	%
1995	21637	19.5	35709	53.5	57346.1	38.6	37.7	62.3	-14072	60.6
1996	23224.5	7.3	43626.6	22.2	66851.1	16.6	34.7	65.3	-20402.2	53.2
1997	26261.1	13.1	48558.7	11.3	74819.8	11.9	35.1	64.9	-22297.6	54.1
1998	26974	2.7	45921.4	-5.4	72895.3	-2.6	37.0	63.0	-18947.4	58.7
1999	26587.2	-1.4	40671.3	-11.4	67258.5	-7.7	39.5	60.5	-14084	65.4
2000	27774.9	4.5	54502.8	34	82277.7	22.3	33.8	66.2	-26727.9	51
2001	31334.2	12.8	41399.1	-24	72733.3	-11.6	43.1	56.9	-10064.9	75.7
2002	36059.1	15.1	51553.8	24.5	87612.9	20.5	41.2	58.8	-15494.7	69.9
2003	47252.8	31	69339.7	34.5	116592.5	33.1	40.5	59.5	-22086.9	68.1
2004	63167.2	33.7	97539.8	40.7	160706.9	37.8	39.3	60.7	-34372.6	64.8
2005	73476.4	16.3	116774.2	19.7	190250.6	18.4	38.6	61.4	-43297.7	62.9
2006	85534.7	16.4	139576.2	19.5	225110.9	18.3	38.0	62.0	-54041.5	61.3
2007	107271.7	25.4	170062.7	21.8	277334.5	23.2	38.7	61.3	-62791	63.1
2008	132002.6	23.1	201960.8	18.8	333963.4	20.4	39.5	60.5	-69958.2	65.4
2009	102142.6	-22.6	140928.4	-30.2	243071.0	-27.2	42.0	58.0	-38785.8	72.5
2010	113883.2	11.5	185544.3	31.7	299427.5	23.2	38.0	62.0	-71661.1	61.4
2011	134906.9	18.5	240841.7	29.8	375748.6	25.5	35.9	64.1	-105934.8	56.0
2012	152461.7	13.0	236545.1	-1.8	389006.8	3.5	39.2	60.8	-84083.4	64.5

Source: Turkish Statistical Institute.

The next section focuses on recent developments in Turkish trade and analyses the development of trade relations between Turkey and its main trading partners and regions.

Recent developments in Turkish trade

Beginning from the establishment of the Turkish Republic, there have been several factors that determine Turkish trade flows. In recent decades, the most important ones have been the globalization process and the Turkish accession to the CU (without full EU membership). With regard to its trade openness, Turkey has increased its trade to GDP share substantially. But when we compare the Turkish trade openness over time to other open economies, Turkey is not an exceptional case: it even slowed down in terms of its trade to GDP ratio at the beginning of this century, see Figure 4-3.

Figure 4-3: Openness of the Turkish economy in comparison to selected countries (1950-2012).
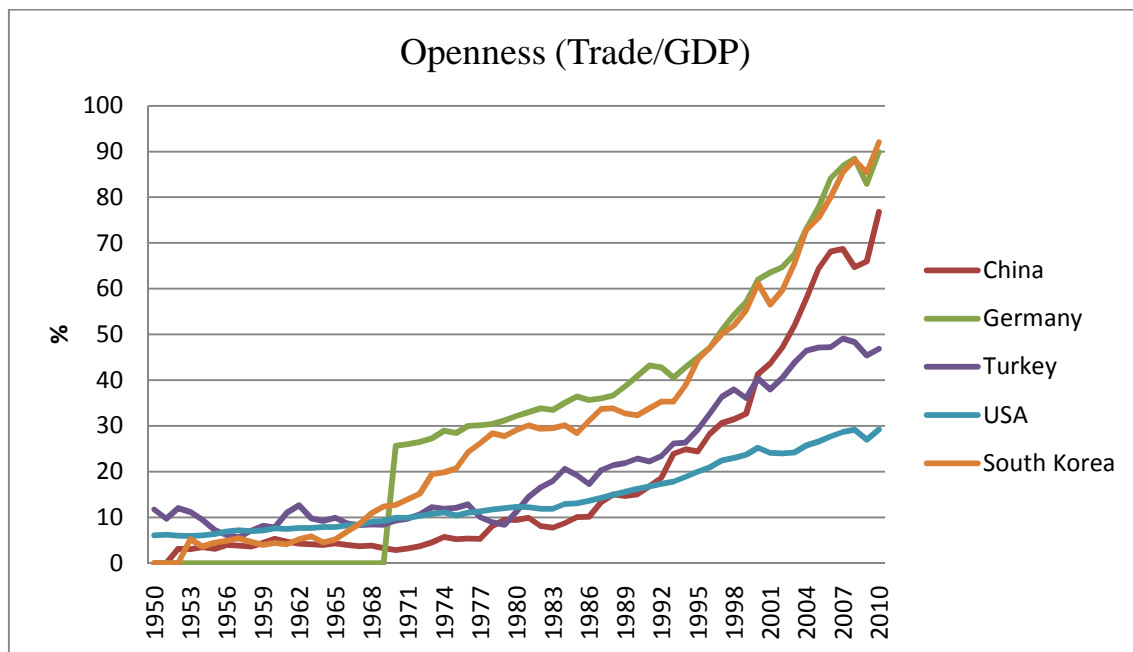
Source: Turkish Statistical Institute
Note: Trade = Exports + Imports

However, in recent years, it is not the increase in total terms that has been most relevant. But it is the fact that due to geographical, historical, and political reasons, Turkey finds itself in the middle of the world's new energy corridor reaching from the Caspian Sea to Europe after the collapse of the Soviet Union. Plus, Turkey itself has also experienced an increasing need for energy and signed significant long-term energy contracts with gas-exporting countries such as Iran and Russia in the late 1990s. Such developments have changed the trading partners of Turkey in recent years. Table

4-11 below shows the first 10 countries for the period 1996-2012 in Turkey's export and import flows.

Table 4-11: Top ten export and import partners (1996 and 2012)

Export				Import			
1996		2012		1996		2012	
Country	% of total X	Country	% of total X	Country	% of total M	Country	% of total M
Germany	22.3%	Germany	8.6%	Germany	17.9%	Russia	11.3%
USA	7.1%	Iraq	7.1%	Italy	9.8%	Germany	9.0%
Russia	6.5%	Iran	6.5%	USA	8.1%	China	9.0%
Italy	6.2%	United Kingdom	5.7%	France	6.4%	USA	6.0%
United Kingdom	5.4%	U.A.E	5.4%	United Kingdom	5.8%	Italy	5.6%
France	4.5%	Russia	4.4%	Russia	4.4%	Iran	5.1%
Netherlands	3.3%	Italy	4.2%	Saudi Arabia	3.9%	France	3.6%
Belgium Luxembourg	2.1%	France	4.1%	Netherlands	3.3%	Spain	2.5%
Saudi Arabia	1.9%	USA	3.7%	Japan	3.3%	India	2.5%
Spain	1.6%	Spain	2.4%	Spain	2.4%	South Korea	2.4%
Total (10)	**60.9%**	**Total (10)**	**52.0%**	**Total (10)**	**65.2%**	**Total (10)**	**57.0%**

Source: Turkish Statistical Institute.

With regard to diversification of trade in exports and imports, we find that the share of the ten major trading partners decreases in imports and exports. With regard to exports, a decrease of trade with Europe can be identified with decreasing exports to Germany and partly to France, Italy, and the Netherlands. The export share of the USA also decreases by half. Countries such as Iraq, Iran or the U.A.E. gained shares of exports – as this change is visible especially in exports, Turkey has changed trade patterns not only due to higher energy imports but other forces such as regional trade and strong growth in the U.A.E. drive the trade patterns change, too. With regard to import shares, we find two major energy suppliers, Russia and Iran, gaining shares, while European countries and the US lose import shares. Of the countries in transition, China, India and South Korea have substantial trade shares with regard to Turkish imports.

4.4.3. Concentration of Turkish trade

Concentration ratios

Country concentration analysis is derived from the market concentration analysis of the industrial organization literature. Curry and George (1983) discuss the theoretical background of concentration indices. They argue that scale, market structure, and the degree of market entry barriers determine concentration rates. Bailey and Boyle (1971) analyze which concentration measure yields better results. They argue that none of the measures is better than the other and that these measures are not dependent on the number and size of firms operating in the market. Sleuwagen and Dehandschutter (1986) arrive at a similar conclusion. Over time, market concentration indices started to be used in measuring the trade performance of countries. For example, Beckerman (1956) analyzed country concentration in exports and imports for OEEC (Organization for European Economic Co-operation) countries and found that there is an inverse relationship between country concentration and distance. Massell (1964) analyzed the relationship between export concentration and export revenues and showed that a decrease in country concentration stabilizes export revenues. Lall (1998) analyzed the export performance of developing countries and showed that exports of these countries have increasing manufacturing share. Low et al. (1998) investigated whether globalization has caused a change in the country concentration of trade and investment (FDI) and found that country concentration has declined in the last 20 years.

Country concentration of Turkish trade flows has been studied previously. Ergün (1991) analyzed country concentration of Turkish exports for the period 1975-1989 and found that it declined for the period. Country concentration of imports in Turkey has been studied by Togan (1994). This study has shown that Turkey's import concentration has declined. Erlat and Akyüz (2003) analyzed country concentration of imports and exports at the industry level and found that Turkey's export concentration has significantly declined and that import concentration has not changed significantly.

In this section, we use five different indices to analyze country concentration of Turkey's trade flows. We shortly summarize each index below. All these indices use one common measure: trade share. Let us suppose that a country has trade relations with N countries and that we denote exports or imports of a country to or from a jth country at time t by q_{jt}. In that case, the share of jth country in exports or imports would be s_{jt}, which is defined as:

$$s_{jt} = \frac{q_{jt}}{q_t} \qquad j = 1,...,N \text{ and } t = 1,...,T \qquad\qquad (1)$$

All indices below use this measure to compute country concentration.

Concentration Ratio (CR-index)

The Concentration Ratio is a widely used empirical measure of industrial structure in the field of Industrial Organization and is defined as the market share of the top n firms. Analogously, in the context of international trade, it is defined as the share of the top n countries in imports or exports of a country. Formally, it is defined as

$$CR(n) = \sum_{j=1}^{n} s_{jt} \qquad\qquad (2)$$

By CR, what is actually being measured is the degree of inter-element dispersion within a vector. An increase in the value of the index signals a growing trade specialization. The comparison of CRs in time would allow us to determine whether the level of trade specialization increased or decreased for the top n countries.

Herfindahl-Hirschman Index (HH-Index)

The Concentration Ratio suffers from two major drawbacks. The first is the subjectivity of choosing n. A result one gets from the top 4 countries may differ significantly from a result for the top 5 countries, or top 10 countries. In general, relative rankings of concentration may differ with different choices of n. The second (and related) weakness of the CR(n) is that it does not take into account the full information available in the underlying concentration curve (distribution) representing all possible n values. An alternative to CR(n) that reflects more fully all the information in the concentration curve is the Herfindahl-Hirschman index (HH). For a country having import or export transaction with N countries, it is defined as follows:

$$HH = \sum_{j=1}^{N} s_{jt}^{2} \qquad\qquad (3)$$

where s_{jt} is the export or import share of the j_{th} country. In the trade context, the HH index is the sum of the squares of the trade shares of all of the countries in the industry. In principle the HH

index can reach a minimum of 0 – when there is a very large number of very small trading partners, each with a trivial trade share, or a maximum of 1– where there is only one country controlling one hundred percent of the market. The point to understand is that higher values of the HH index reflect the combined influence of both unequal export or import sizes and the concentration of activities in a few countries. It is this ability to reflect both average trade (export or import) size and inequality of trade size between countries that leads economists to prefer the HH index to simple concentration ratios.

Rosenbluth-Hall-Tideman Index (RHT-Index)

The next summary measure, the Rosenbluth-Hall-Tideman (RHT) index, requires s_{jt} to be put in descending order because the trade shares s_{jt} are weighted by their ranks, included in the country specification j. Small sized countries which do not have a significant effect in the HH index are listed further down in the country ranking and thus, changes of their trade shares have a larger effect on the concentration index. RHT is calculated as

$$RHT_t = \left[\left(2\sum_{j=1}^{N} j \cdot s_{jt} \right) - 1 \right]^{-1} \qquad \text{where} \qquad \frac{1}{2N-1} \leq RHT \leq 1 \tag{4}$$

Entropy Index (E-Index / H-Index)

The final summary measure of concentration is the Entropy (E) index. The s_{jt}'s are weighted by the natural logs of the inverses of the s_{jt}'s:

$$E_t = \sum_{j=1}^{N} s_{jt} \cdot \ln\left(\frac{1}{s_{jt}} \right) \tag{5}$$

Hence, small values of the entropy index reflect high concentration, as opposed to the previous three measures. In order to make it comparable with the other measures, the inverse of the antilog of E_t is used and called H_t:

$$H_t = \frac{1}{anti\log(E_t)} = \prod_{j=1}^{N} s_{jt}^{s_{jt}}$$

(6)

Comprehensive Measure of Concentration Index (CCI-Index)

Our last measure of concentration, the Comprehensive Measure of Concentration (CCI) index, combines the characteristics of both discrete and summary measures. As RHT, it requires the trade shares s_{jt} to be put in descending order but its main focus is on the largest s_{jt}, namely s_{1t} and the remaining s_{jt}'s are used to adjust s_{1t}:

$$CCI_t = s_{1t} + \sum_{j=2}^{N} s_{jt}^2 \left(1 + (1 - s_{jt})\right)$$

(7)

After this brief summary of concentration measures in trade, we may now undertake our descriptive analysis.

Descriptive analysis of Turkish trade concentration

In this section, we discuss changes of Turkish trade concentration on the basis of the concentration measures introduced in the previous section. We use export and import data provided by the Turkish Statistical Institute (TUIK) which covers the 1996-2012 period. First, the analysis focuses on the concentration ratios, thus the trade shares, for the ten main trading partners, respectively.[61] Second and subsequent to the discussion of Turkish trade concentration, we discuss the changes in trade shares for world regions such as North African countries, regional organizations such as the EU, and selected country clusters such as the neighboring countries of Turkey. This second step is necessary to show not only general structural changes in Turkish trade but also to link trade changes to geographical regions and selected country clusters and groups.

---

[61] The results of this chapter do not change qualitatively when we examine the concentration ratios for the 50 or 90 main trading partners.

Concentration of trade for main Turkish trading partners

With regard to total trade, the general concentration did not change dramatically from 1996 to 2012. The concentration measures for total trade are displayed in Figure 4-4. The concentration ratio shows only marginal changes, thus, in total the ten major trading partners of Turkey hold their trade shares over time. It is important to note that the individual countries forming the ten major trading partners change over time. This has been discussed in the previous section on the openness history and is taken up again in the following appendix on relative changes. The other indices remain almost constant as well. The only substantial changes are displayed by the CCI. The decreasing trend in CCI is due to the dependency on the highest trade share per year which decreased substantially from 1996 to 2012. Thus, we find that the ten major trading partners constantly hold their share, but that the one major trading partner, which is Germany, strongly loses ground.

Figure 4-4: Concentration of total trade for 10 major trading partners (1996-2012).
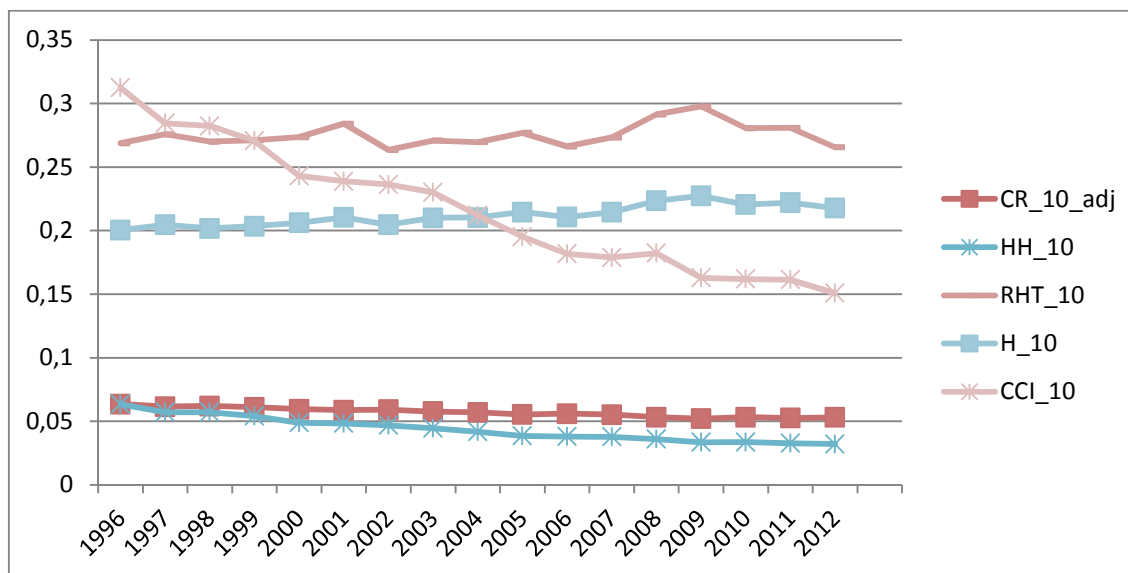
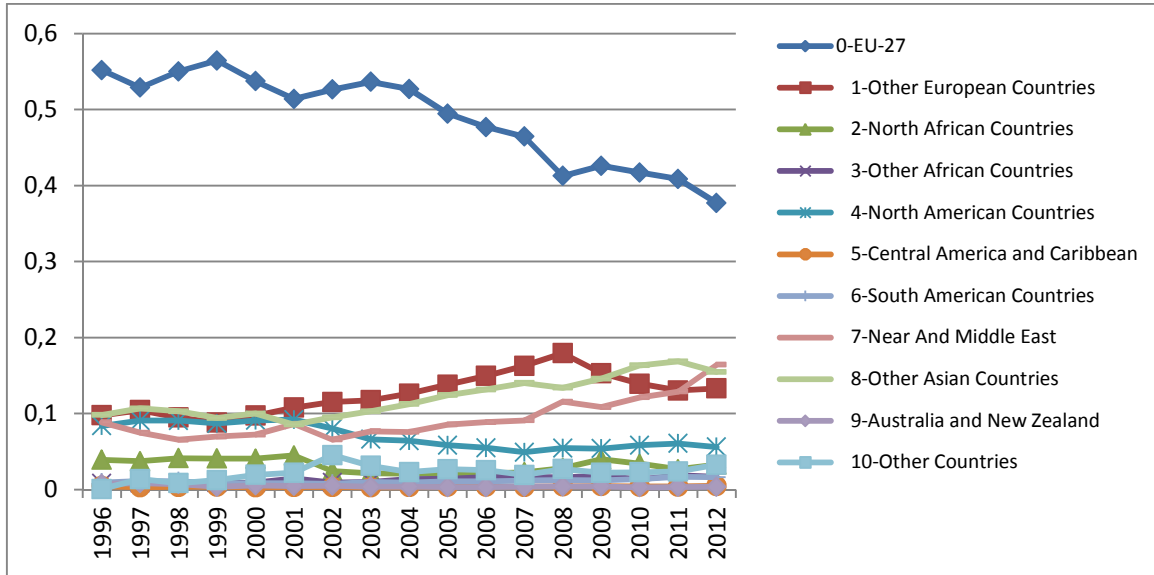**Source: Turkish Statistical Institute.**
Note: CR = Concentration Ratio, HH = Herfindahl- Hirschman Index, RHT = Rosenbluth-Hall-Tideman Index, H = Entropy-Index, CCI = Comprehensive Measure of Concentration Index

We find comparable trends for imports and for exports which are displayed in Figure 4-5 and Figure 4-6, respectively. The concentration ratios for Turkish imports are even more stable than the ratios for total trade. Interestingly, the CCI decreases substantially, too, but in 2012 it increases again. This is due to the fact that in imports, the main trading partner changed and, thus, the kink in 2012 reflects the positive trend in imports from Russia that overtook Germany as main import partner.

Figure 4-5: Concentration of Turkish imports for 10 major import partners (1996-2012).
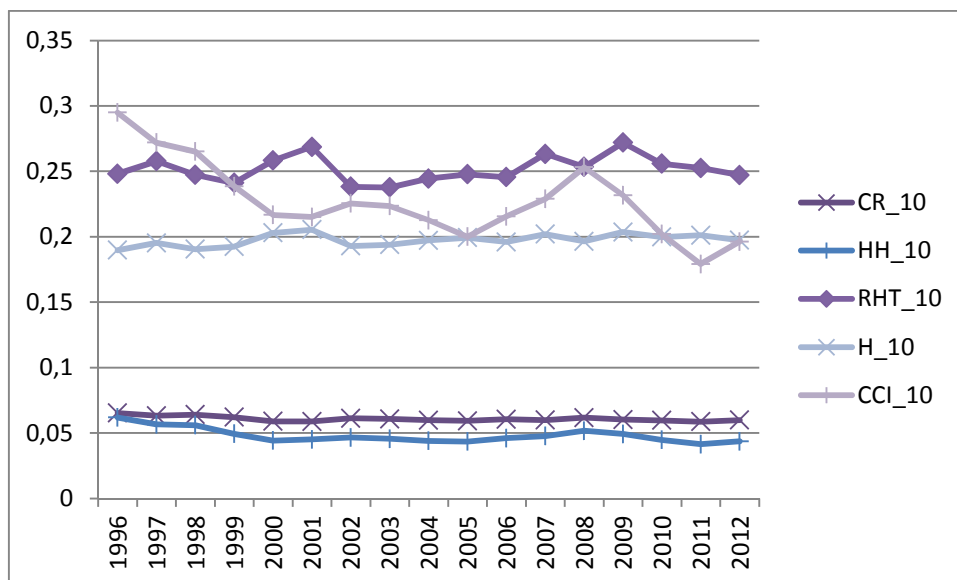
Source: Turkish Statistical Institute.
Note: CR = Concentration Ratio, HH = Herfindahl- Hirschman Index, RHT = Rosenbluth-Hall-Tideman Index, H = Entropy-Index, CCI = Comprehensive Measure of Concentration Index

As total trade is the sum of exports and imports and as the import concentration ratios are more stable than the ratios for total trade, export concentration ratios vary more. In exports, we find a decreasing trend in all concentration ratios. The CCI again points to the fact that the main trading partner, Germany, loses ground to other trading partners. But also the other concentration ratios decrease, reflecting a diversification of Turkish exports. The only ratio that does not follow this at least slightly decreasing trend is the Entropy- or H-index. As this index is based on the logarithm of trade shares, a concave function of the shares, it is more influenced by changes in the shares of the smaller countries. This is the explanation to its slight increase. The other indices decrease when the main trading partner, with a large share compared to the remaining nine main trading partners, loses ground. The H-index reflects more the gain of the remaining nine trading partners as they gain shares. Altogether, we have a slight decrease in export concentration and the different concentration ratios provide further information that the strongest trading partner loses shares substantially while the remaining nine trading partners gain shares so that the group of ten major trading partners can hold its total share of Turkish exports.

Figure 4-6: Concentration of Turkish exports for 10 major export partners (1996-2012).
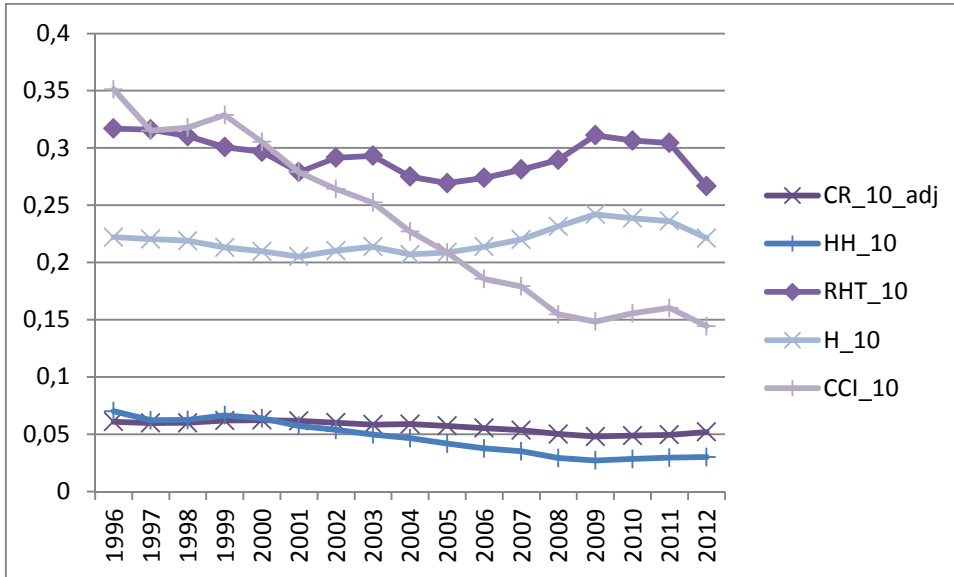
Source: Turkish Statistical Institute.
Note: CR = Concentration Ratio, HH = Herfindahl- Hirschman Index, RHT = Rosenbluth-Hall-Tideman Index, H = Entropy-Index, CCI = Comprehensive Measure of Concentration Index

This analysis with general concentration measures, here for the ten major trading partners, provides only information about the general structure of Turkish trade. In the following, we focus on structural changes in trade with regard to regions and selected country groups and clusters.

Turkish trade by world region

Displaying trade shares by world region allow one to discuss changes with regard to geography. Figure 4-7 presents these trade shares for total trade by world regions.

Figure 4-7: Trade shares for total trade by world regions.

Source: Turkish Statistical Institute.

Note: EU-27 = European Union (before accession, trade shares are still accumulated for the 27 EU countries)

Ten exclusive regions are defined to cover Turkish total trade with the whole world. Only five of them have significant trade shares. These are the EU-27 countries, other European countries, North American Countries, Other Asian Countries and the Near-East and Middle-East. The EU-27 is by far the most important trading partner of Turkey. Nevertheless, its importance decreased from a share of more than 50% to below 40%. The same happened to the other "Western" world region, the North American countries. This region also lost trade shares. But as the absolute magnitude of trade share is limited, the loss is only substantial when we consider relative terms. In the meantime, the three other regions gained ground and increased their trade shares. The other European countries, e.g. most of the Balkan countries, had an increasing trade share, but only up to the crisis in 2009. The countries of the Near and Middle East and the other Asian countries, which include China and India, have continuously increasing trade shares and both reach a level of approximately 15% of Turkish total trade. Thus, we find a diversification of total trade with regard to the world regions, with Western countries in Europe and North America losing shares and the neighbor region Near and Middle East and the Asian countries gaining shares.

Figure 4-8: Trade shares for exports to world regions.

Note: EU-27 = European Union (before accession, trade shares are still accumulated for the 27 EU countries)

In addition to total trade we will examine the trade shares for export and import shares. Figure 4-8 shows the export share by world region. Again, we find EU-27 clearly as the most important partner, but its share of exports decreases despite a short increase and very stable period from 1996 to 2007. It is quite surprising that the other regions also have very stable trade shares in exports which change for some regions in the middle of the last decade – most prominently, the region Near- and Middle-East. It seems that Turkey has recently discovered new markets for its exports in the neighboring region as the trade share almost triples and approaches the EU-27 level. Another, more continuous change is the loss of the North American region which begins already in 2000.

Figure 4-9: Trade shares for imports from world regions.
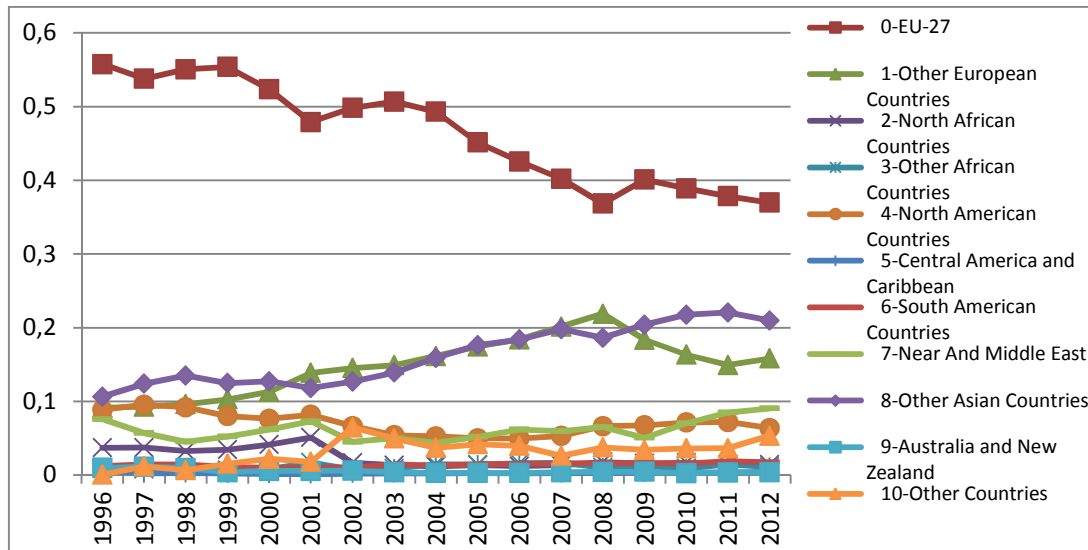
Note: EU-27 = European Union (before accession, trade shares are still accumulated for the 27 EU countries)

Figure 4-9 displays the trade shares for imports by world region. With regard to imports, we do not find the strong increase for the Near- and Middle-East trade share that we identified for the exports. In this figure, the Asian countries play a much more prominent role as they have even the second highest share with regard to imports. This region includes India, China and the South Asian countries such as Vietnam or Thailand. Therefore, an increase in imports is not surprising but the doubling of the trade share is still considerable.

Concentration of trade for selected regional organizations

To represent the historically strong trading block of Western countries, we include the European Union, the OECD countries, and the EFTA countries. For the neighboring regions of Turkey in North Africa, the Middle East and the Post-Soviet states we chose the Organization of the Black Sea Cooperation (BSCE), the Economic Cooperation Organization (ECO), the Commonwealth of Independent States (CIS), the Turkish Republics and the Organization of Islamic Conference (OIC).[62]

---

[62] A list with the member countries by regional organization is attached in the appendix

Figure 4-10: Trade shares for total trade with selected regional organizations.
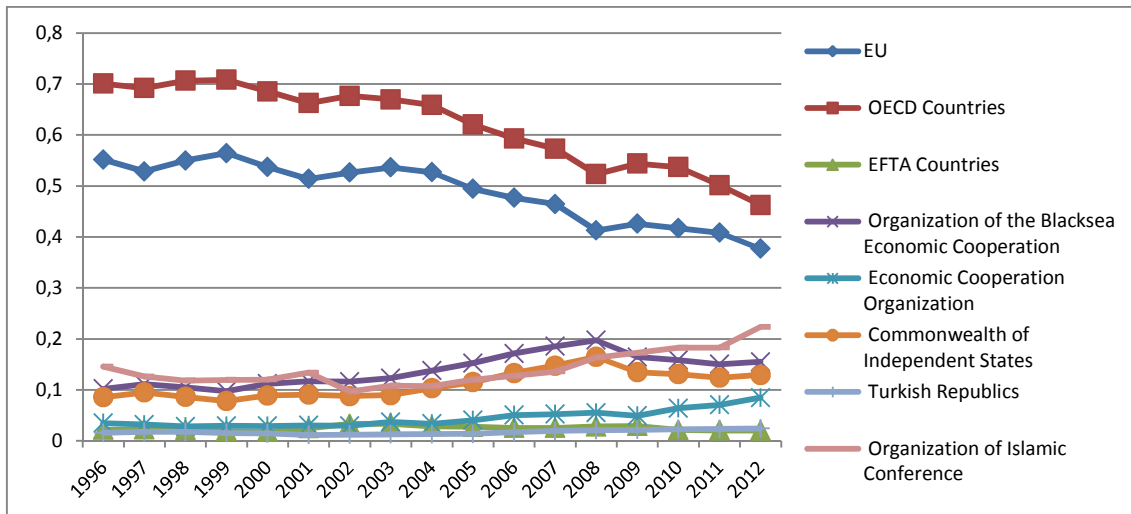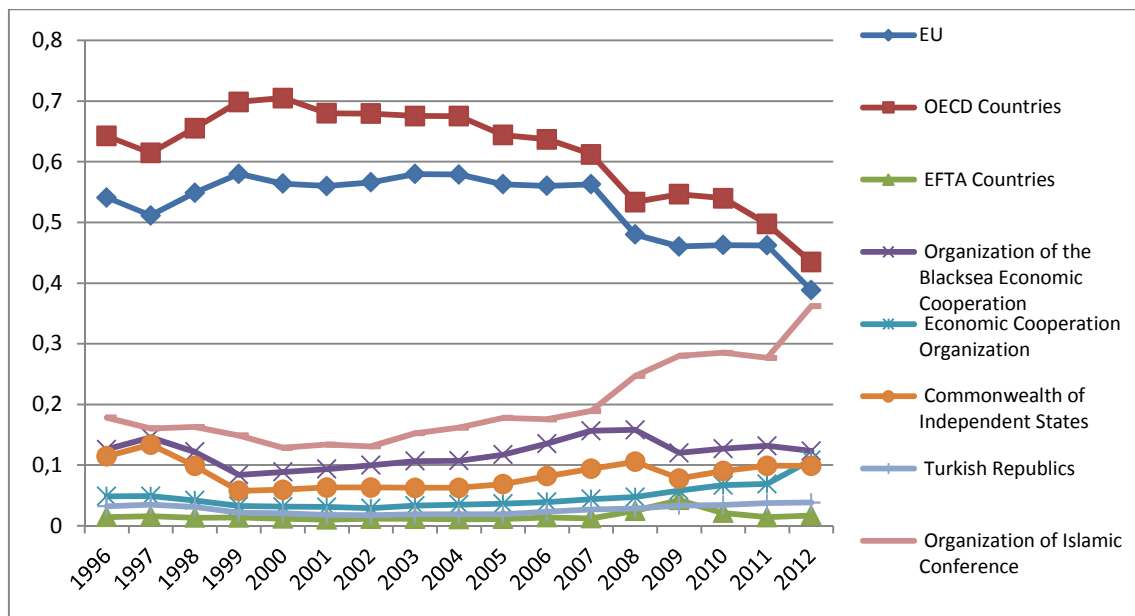

Source: Turkish Statistical Institute.

Note: EU = European Union, OECD = Organization of Economic Cooperation and Devleopment, EFTA = European Free Trade Area

Figure 4-10 presents the trade shares for the selected regional organizations. The Western organizations have high trade shares when compared to the others. In 1996, the OECD had a share of almost 70% while the EU as part of the OECD already had a share around 55%. The EFTA countries are negligible with regard to trade shares. The trend for the Western countries shows a continuously decreasing trade share. In comparison to the high trade shares in 1996, the OECD and the EU remain the main trading partners of Turkey, but they lost ground. The OECD share has fallen below 50% and the EU share below 40%. Furthermore, we see that the OECD and the EU ratios converge. This shows that the loss in trade shares is even higher for the non-EU members of OECD. Namely, the USA is losing shares of Turkish trade. The other block of regional organization does not show this decreasing trend. This is not an automatism as all shares in total do not represent a unity, as we left out a large amount of countries in the calculations and for example the OECD, EU and EFTA members overlap. Thus, the increasing trend for the neighboring regions still represents a considerable increase of trade share with Turkey. The Turkish republics do not have any significant trend, upwards or downwards, but trade with the BSCE and the CIS increases up to 2008 and then decreases again. Still, the trade shares increased over time but it seems that especially the crisis of 2009 had a negative effect on this trade. The two remaining regions, the ECO with Pakistan and Iran and the Organization of Islamic Conference show a trend that is continuously

138

increasing. Both trade shares almost doubled and neither had a negative, long-term effect from the financial crisis in 2009. This increase in trade share has to be analyzed further as it could be due to growing interregional trade in general or only be dependent on the increasing demand for resources of the growing Turkish economy, especially for oil and gas.

For a more in-depth analysis, Figure 4-11 and Figure 4-12 display the trade shares for imports and exports, respectively.

Figure 4-11: Trade shares for imports from selected regional organizations.
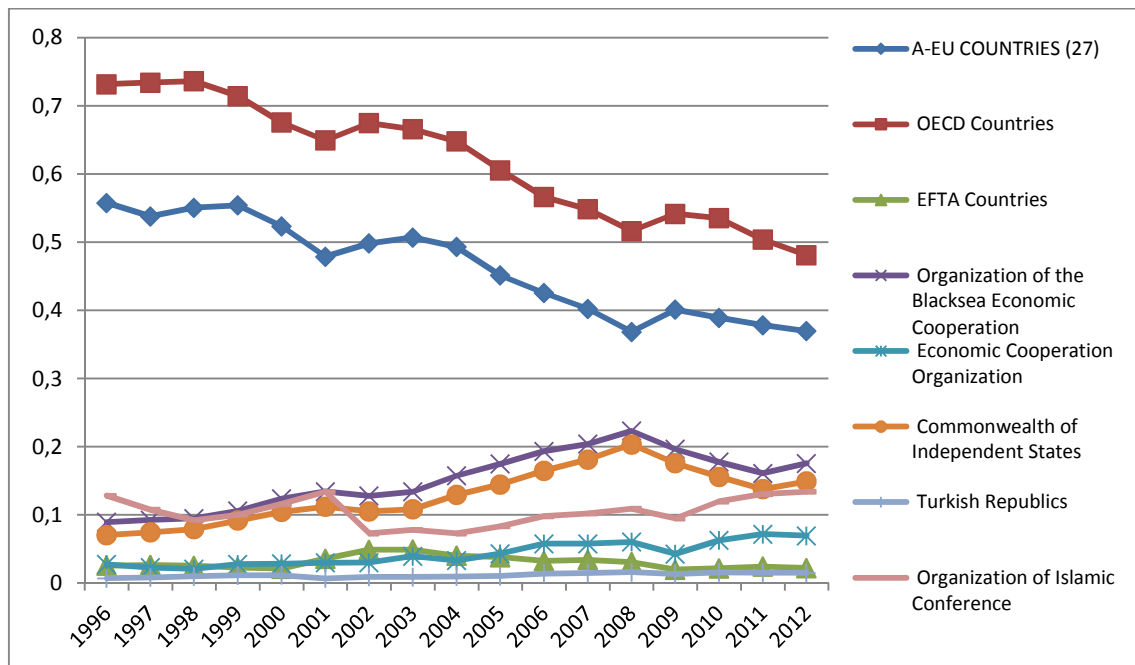
Source: Turkish Statistical Institute.
Note: EU = European Union, OECD = Organization of Economic Cooperation and Devleopment, EFTA = European Free Trade Area

The shares of the main import partners of Turkey follow a similar trend as the total trade shares. The Western countries are the main trading partners of Turkey, but over time, their shares decrease substantially. EFTA and the Turkish Republics remain insignificant but there is a difference with regard to the remaining regions. With regard to imports, the CIS and the BSCE have again an increasing trend with a kink in 2009. Their shares are comparable to total trade shares, but for the ECO and the OIC, the shares are much lower. Thus imports of Turkey also diversify but despite that, the imports follow the general trend. Moreover, the ECO and the OIC do not have the high

shares they have in total trade and, thus, it is not the import of raw material which drives the total trade shares in these cases.

Figure 4-12: Trade shares for exports to selected regional organizations.

With regard to total trade and import, these differences in trade shares are explained when we examine the trade shares of exports. We find the same trends but it is obvious that especially the OIC share increases remarkably. In 2012, it almost reaches the EU level. Such a convergence is not observable in any other figure for these regional organizations. Thus, it is Turkish exports that drive the total trade share increase of OIC. This is a result which needs further analysis as it confirms one research hypothesis of this paper, namely, that Turkey reestablishes its position as regional bridge builder and that this powerful regional position is visible in trade flows. For the remaining organizations the trends are similar to what we have found for total trade shares.

4.4.4.   Relative changes for individual trading partners

In this appendix, we further analyze the changes of Turkish trade concentration. This section discusses the changes for individual countries. First, the focus lies on the main trading partners in 2012 and the development of their ranks with regard to import or export shares. Second, we present the countries with at least 0.5% of export or import share and the change in their trade shares in 2012 compared to 1996. This analysis provides a much more detailed, country specific discussion, in addition to the previous section which focused more on regions or country clusters.

Ranking of main trading partners in 2012 compared to 1996 rankings

Figure 4-13: Country ranks in Turkish imports (1996-2012).
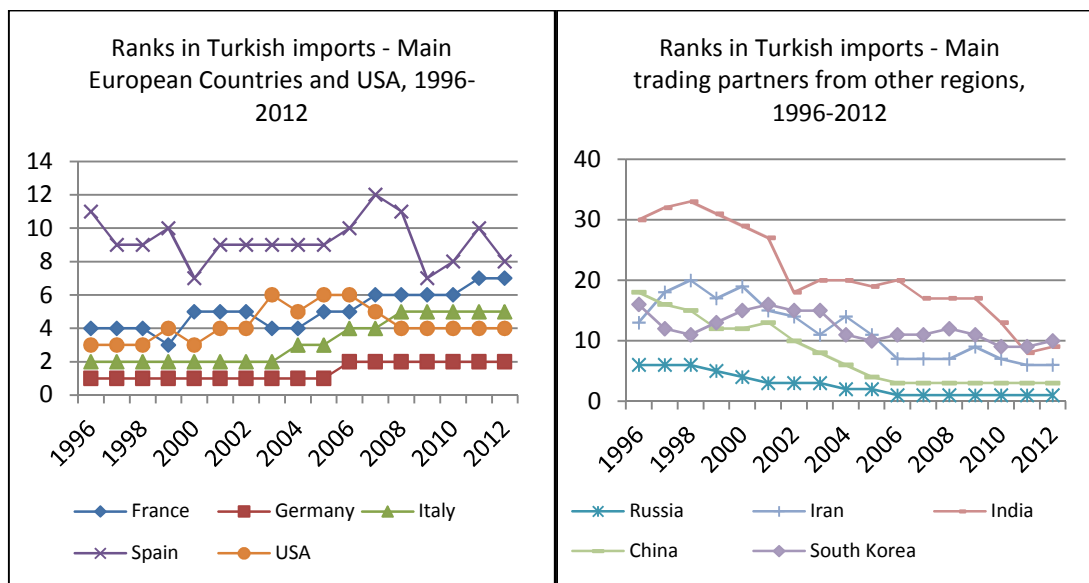
Source: Turkish Statistical Institute.
Note: The ranks show the magnitude of trade shares, thus the closer to the abscissa, the higher the trade share.

Figure 4-13 plots country ranks of Turkish imports between 1996 and 2012 for the ten countries that have the highest ranks in 2012. The graphs show that some countries such as Russia, China, Iran, India and South Korea have become significant import sources for Turkey. Increasing import flows with China, Iran and Russia designate two important strategic changes in Turkish import flows. The former is Turkey's energy dependency due to growing manufacturing and service industries. This fact is the main reason of increasing imports from Russia. In addition, the rising importance of

China as a source country for the world and for Turkey as well is the reason for the second change in Turkish import flows (Yetkiner, 2009: 1).

Figure 4-14: Country ranks in Turkish exports (1996-2012).

Note: The ranks show the magnitude of trade shares, thus the lower, the higher the trade share.

Figure 4-14 plots country ranks of Turkish exports between 1996 and 2012 for the ten countries that have the highest ranks in 2012. The illustration shows that some countries such as Iraq[63], U.A.E., and Iran have become significant trade partners of Turkey. Although a considerable fraction of exports to the U.A.E. consists of textile products, it is thought that increasing exports to U.A.E. indicate a strategic change in Turkish export flows. This underlines again the findings by Yetkiner (2009: 3), as these changes became even more persistent up to 2012.

---

[63] Data is available from 2003 onwards.

Relative changes in trade shares of individual countries

Alongside discussing the structural changes for the main trading partners, regions or other clusters of countries, the discussion of relative changes for individual countries will provide a picture of the major relative structural changes. In this case, the doubling of trade share can be from 1% to 2% or from 10% to 20%. As very small trade shares can divert substantially due to very small trade activities, this analysis sets a threshold to a minimum of 0.5% in trade shares for an inclusion in the analysis. Figure 4-15 displays the major losses (more than 20%) in trade shares with regard to total trade.

Figure 4-15: Loss in total trade shares in percent from 1996 to 2012.
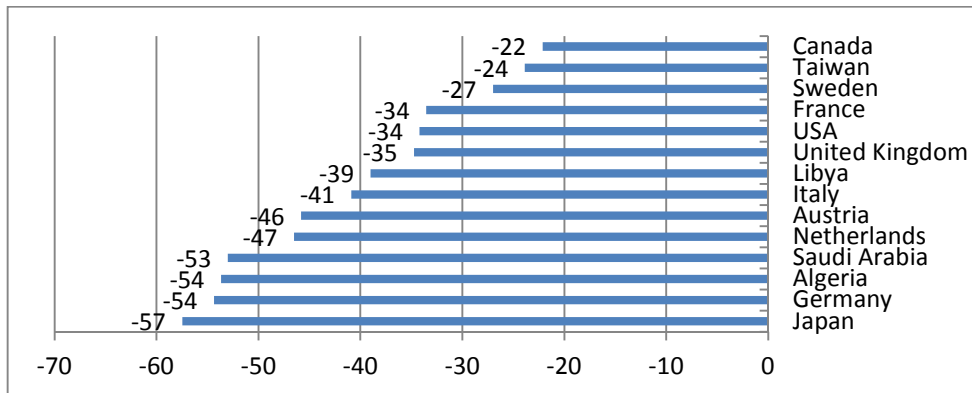
Source: Turkish Statistical Institute.
Note: Change in trade shares is given in percentage by comparing the trade share of a country in 1996 to 2012.

The main group with total trade shares decreasing by more than 20% are Western countries. This includes European countries, especially Germany, but also the USA, and Canada. In addition, Taiwan and Japan lost shares in total trade. This could be due to a reorientation to other partners in Asia. The third group of countries with decreasing trade shares is from the MENA region: Algeria, Libya and Saudi Arabia. Before we found evidence for increasing trade shares for this region, but for these three countries the opposite is the case. Figure 4-16 underlines that the MENA region is also gaining shares, as Iran and especially the U.A.E. belong to the group with the highest gain in trade shares since 1996.

**Figure 4-16: Gain in total trade shares in percent from 1996 to 2012.**
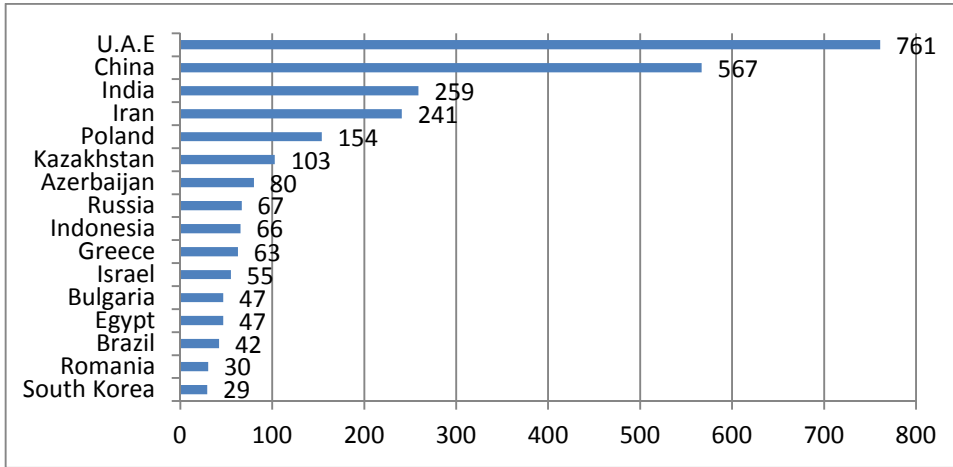
The reason for these changes could be due to changing import sources for oil and gas. We find U.A.E., Iran but also Kazakhstan, Azerbaijan and Russia with increases of trade shares – all of them providing these resources. In addition to the MENA countries and the neighboring countries in the Caucasus and close-by Central Asian countries, selected European countries and emerging economies gained trade shares. The latter shows the increasing importance of these emerging countries, e.g. China, India but also Indonesia and Brazil. A growing economy is definitely a reason for the presence of some European countries with increased trade shares, but this shows furthermore that there is no ideological barrier that decreases trade with Europe, as some lose but some also gain trade shares relative to 1996. Thus, the analysis shows that Turkey is strengthening its regional trade and that the role of a regional power with a possible bridge builder function for EU and MENA is a potential scenario visible in the trade patterns.

To discuss the changes for the individual countries further, we highlight the changes in trade shares also for import and export shares. Figure 4-17 presents the results of the major negative relative changes (>20%) in trade shares for exports from 1996 to 2012.

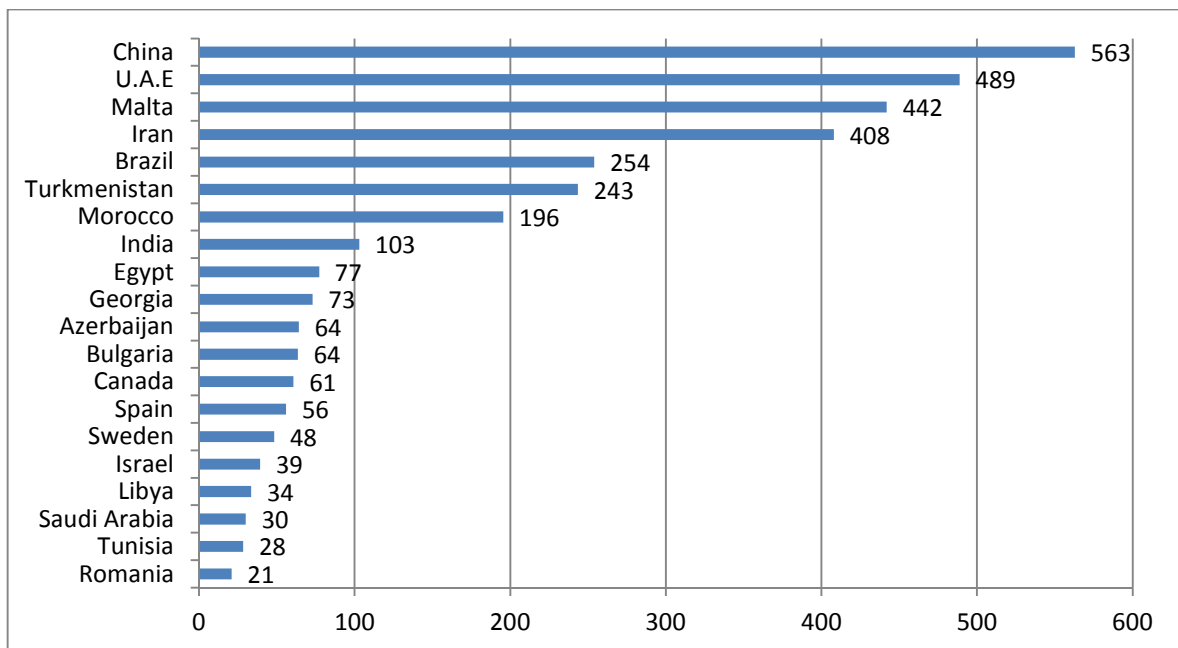**Figure 4-17: Loss in export shares in percent from 1996 to 2012.**
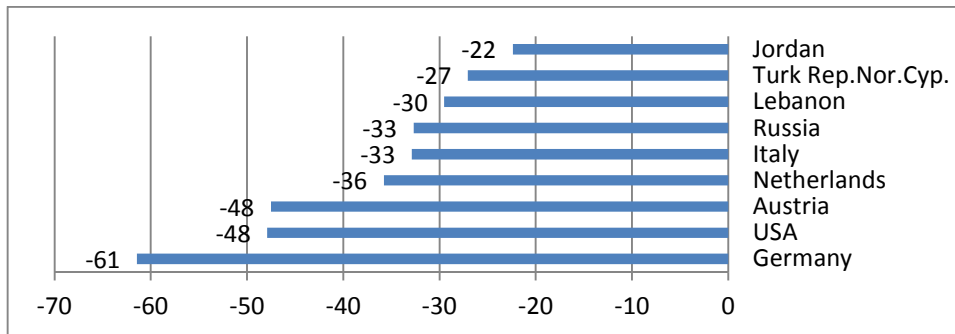
Source: Turkish Statistical Institute.
Note: Change in trade shares is given in percentage by comparing the trade share of a country in 1996 to 2012.

It is not surprising that we find Western countries with the major negative changes in trade share. Germany, USA, Austria, the Netherlands and Italy have the highest loss. Especially for Germany, the export share reduced by 60% compared to 2012. Interestingly, Russia has also lost export shares, despite its importance as an import partner (see Table 4-11). The positive changes above a relative change of 20% are displayed in Figure 4-18.

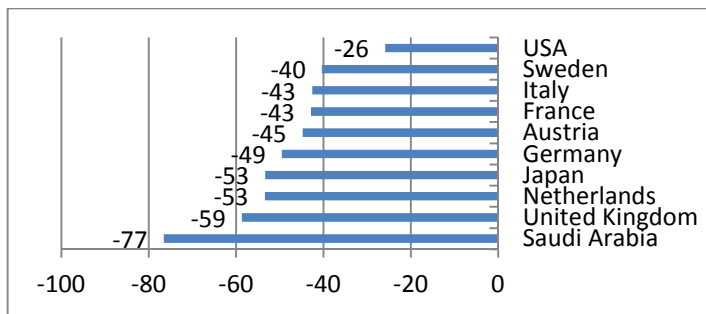**Figure 4-18: Gain in export shares in percent from 1996 to 2012.**

Source: Turkish Statistical Institute.
Note: Change in trade shares is given in percentage by comparing the trade share of a country in 1996 to 2012.

We see immediately that much more countries have high increases in relative trade shares compared to negative relative changes. Furthermore, the changes are much higher than the losses. China even quintuples its relative trade share. Four groups of countries dominate: the big emerging economies (China, India, and Brazil), countries from the Middle East and North African region (8 of 20), the neighboring countries and Turkmenistan and, in addition, selected European countries. This structure of relative changes shows a reorientation of Turkish trade flows. Despite some substantial losses for the Western countries, the trade share for selected European countries even increases. But the largest relative surplus in trade shares can be found for the regional trade of Turkey – again we can argue for the regional bridge builder role - and the trade with the Far East, mainly India and China.

Figure 4-19 displays the losses in import shares. Again we find European countries, Japan and the USA within the group with decreasing trade shares. But interestingly, Saudi Arabia dominates the group with a loss of 77% in trade shares. It has to be further analyzed if this is due to the winning of new markets for oil and gas supply.

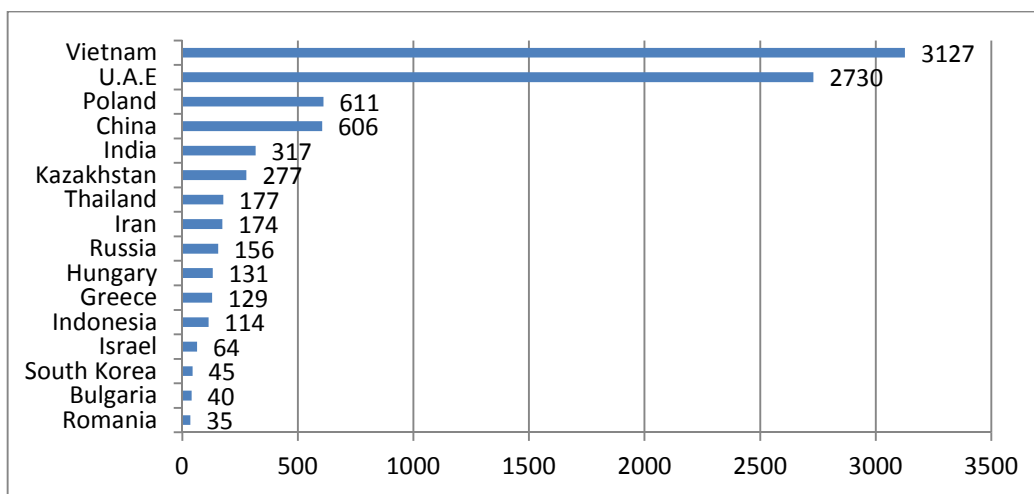**Figure 4-19: Loss in import shares in percent from 1996 to 2012.**

Source: Turkish Statistical Institute.
Note: Change in trade shares is given in percentage by comparing the trade share of a country in 1996 to 2012.

With regard to gains in trade shares since 1996, displayed by figure 4-20, Vietnam and the U.A.E. are by far the leading group. Their trade share grew 31 and 27 times compared to the trade share in 1996. While Vietnam is close to the selected threshold of 0.5% and therefore, its trade with Turkey in absolute terms does not reflect a substantial part of Turkish trade, the result for U.A.E. underlines its increasing importance for Turkey. With regard to country groups, we find again increases for emerging economies and countries from the MENA region. With regard to the discussion on

changing trade patterns for oil and gas, we find gains in import shares for suppliers such as U.A.E., Iran, Russia or Kazakhstan. Interestingly, we find a large number of European countries with increasing import shares, which again shows that the European trend of a decreasing importance for Turkish trade is not consistent for all European countries or for the EU countries.

Figure 4-20: Gain in import shares in percent from 1996 to 2012.

Note: Change in trade shares is given in percent by comparing the trade share of a country in 1996 to 2012.

4.5. References

ABREC. 2011. "Rapport d'activités 2010." Lomé (Togo).

Adam, Antonis, and Thomas Moutos. 2008. "The Trade Effects of the EU-Turkey Customs Union." The World Economy, vol. 31, issue 5, p. 685-700.

AFDB. 2009. "Support to a Network of African Institutions of Science and Technology Projects: ECOWAS region: Project appraisal report." African Development Bank Group, Tunis.

Alpar, Cem. 1974. "Türkiye'nin Planlı Dönemde İmalat Sanayiini Koruyucu Dış Ticaret Politikası." İTİA Yayını, No. 74, Ankara.

Anderson, James, and Eric van Wincoop. 2003. "Gravity with Gravitas: A Solution to the Border Problem." American Economic Review, 93(1):170-192.

Anderson, James. 1979. "A Theoretical Foundation for the Gravity Equation." The American Economic Review, V. 69, No. 1, pp. 106-116.

Antonucci, Daniele, and Stefano Manzocchi. 2006. "Does Turkey have a special trade relation with the EU? A gravity model approach." Economic Systems, V. 30, pp. 157–169.

AU. 2009. "Regional Report on Education: Fourth Ordinary Session of the Conference of Ministers of Education of the African Union (COMEDAF IV)." Mombasa, Kenya 23 - 26 November 2009: AU/ EXP/EDUC/6 (IV). Mombasa (Kenya).

Backhaus, Klaus, Bernd Erichson, Wulff Plinke, and Rolf Weiber. 2000. "Multivariate Analysemethoden. Eine anwendungsorientierte Einführung." 9th ed. Berlin [etc.]: Springer.

Bailey, Duncan, and Stanley E. Boyle. 1971. "The Optimal Measure of Concentration", Journal of the American Statistical Association, V. 66, No: 336, ss. 279-291.

Baldwin, Richard, and Daria Taglioni. 2006. "Gravity for dummies and dummies for gravity equations." Technical report National Bureau of Economic Research.

Balthasar, Andreas. 2006. "The Effects of Institutional Design on the Utilization of Evaluation: Evidenced Using Qualitative Comparative Analysis (QCA)." Evaluation, 12(3): 353-371.

Befani, Barbara, and Fritz Sager. 2006. "QCA as a tool for realistic evaluations. The Case of the Swiss Environmental Impact Assessment." In Innovative Comparative Methods for Policy Analysis. Beyond the Quantitative-Qualitative Divide, ed. Benoît Rihoux and Heike Grimm, 263-284. Boston MA: Springer Science+Business Media Inc.

Befani, Barbara, Simone Ledermann, and Fritz Sager. 2007. "Realistic Evaluation and QCA: Conceptual Parallels and an Empirical Application." Evaluation, 13(2): 171-192.

Berber, Metin, and Seyfettin Artan. 2007. "Determinants of Trade Flows in Black Sea Economic Cooperation Region: A Gravity Model Approach". The Second Business and Economy International Workshop.

Berg-Schlosser, Dirk, and Lasse Cronqvist. 2011. „Aktuelle Methoden der Vergleichenden Politikwissenschaft. Einführung in konfigurationelle (QCA) und makro-quantitative Verfahren:" UTB.

Berg-Schlosser, Dirk, Gisele de Meur, Benoit Rihoux, and Charles Ragin. 2009. "Qualitative Comparative Analysis (QCA) as an Approach." In Applied social research methods series, Configurational comparative methods. Qualitative comparative analysis (QCA) and related techniques, ed. Benoît Rihoux and Charles C. Ragin, 1-18. Los Angeles, Calif.: Sage.

Bilici, Özgül. 2009. "The Determining Role of EU in Turkey's Trade Flows: A Gravity Model Approach". Master Thesis, 76 pages, Izmir, Turkey.

Bourguignon, François, and Sundberg, Mark. 2007. "Is foreign aid helping? Aid Effectiveness - Opening the Black Box." In: American Economic Review, 97(2), pp. 316–321.

Bundy, Donald, Anthi Patrikios, Changu Mannathoko, Andy Tembon, Stella Manda, Bachir Sarr, and Lesley Drake. 2010. "Accelerating the education sector response to HIV: Five years of experience from sub-Saharan Africa." The World Bank, Washington D.C.

Burnham, Kenneth P., and David R. Anderson. 1998. "Model selection and inference. A practical information theoretic approach." New York [u.a.]: Springer.

Busse, Matthias, and Steffen Groening. 2012. "Assessing the Impact of Trade Liberalization: The Case of Jordan." Journal of Economic Integration, Vol. 27, No. 3, September 2012, pp. 466-486.

Cheng, I-Hui, and Howard J. Wall. 2003. "Controlling for Heterogeneity in Gravity Models of Trade and Integration." The Federal Reserve Bank Working Paper, No: 1999-010D.

COMPASSS. 2013. Software. http://www.compasss.org/software.htm (accessed August 26, 2013).

Cronqvist, Lasse, and Dirk Berg-Schlosser. 2009. "Multi-Value QCA (mvQCA)." In Applied social research methods series, Configurational comparative methods. Qualitative comparative analysis (QCA) and related techniques, ed. Benoît Rihoux and Charles C. Ragin, 69-86. Los Angeles, Calif.: Sage.

Cronqvist, Lasse. 2006. "Using multi-value outcomes with MVQCA. TOSMANA Technical Note." 2.

Cronqvist, Lasse. 2007. „Konfigurationelle Analyse mit Multi-Value-QCA als Methode der vergleichenden Politikwissenschaft mit einem Fallbeispiel aus der vergleichenden Parteienforschung (Erfolg grüner Parteien in den achtziger Jahren)." Dissertation, Universität Marburg, 2007.

Curry Bruce, and Kenneth D. George. 1983. "Industrial Concentration: A Survey", The Journal Of Industrial Economics, V. 31, No. 3, pp. 203-255.

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). 2013. „Productive use of energy (Produse). Measuring Impacts of Electrification on Small and Micro-Enterprises in Sub-Saharan Africa." http://www.produse.org/index.php?lang=eng&page=5 (accessed September 20, 2013).

Dibba, Aminata. 2010. "ECOWAS Gender Development Center." New York, 08.03.2010. Online: http://www.un.org/womenwatch.

Dinges, Sabine, and Sylvia Schweitzer. 2013. "Reality check. Randomised Controlled Trials." Development and Cooperation (D+C)(7): 298-299.

Diop, Mendy. 2012. "UN relief coordinator warns over humanitarian crisis in Africa's drought-hit Sahel." Online (19.02.2013): http://www.un.org.

EBID. 2009a. "EBID from 1st Jan 2004 to 31st Dec 2009: EBID at the heart of development in West Africa." Online: http://www.bidc-ebid.org/en/documentation.php.

EBID. 2009b. "EBID - the ECOWAS bank: Strategic plan 2010-2014." Lomé (Togo). Online: www.bidc-ebid.org.

EBID. 2011. "The project portfolio of EBID as at 31/12/2010." Online: http://www.bidc-ebid.org/en/documentation.php.

ECOSTAT. 2004. "About ECOSTAT." Online (06.07.2012): http://www.ecostat.org/en/standard.php?file=abt.

ECOWAS. 1991. "Protocol on the community court of justice: A/p.1/7/91."

ECOWAS. 2001. "Protocol a/sp1/12/01 on democracy and good governance supplementary to the protocol relating to the mechanism for conflict prevention, management, resolution, peacekeeping and security." Dakar (Senegal). Online (06.07.2012): http://www.comm.ecowas.int/sec/en/protocoles.

ECOWAS. 2005. "Supplementary protocol a/sp.1/01/05: Amending the preamble and articles 1, 2, 9 and 30 of protocol a/p.1/7/91 relating to the community court of justice and article 4 paragraph 1 of the English version of the said protocol." Online: http://courtecowas.org/site.

ECOWAS. 2007a. "ECOWAS commission: Office of the commissioner human development and gender - education, culture, science and technology directorate." Online(06.07.2012): http://www.comm.ecowas.int/.

ECOWAS. 2007b. "Framework for the promotion of the private sector in West Africa: Work programme of the private sector directorate." Abuja (Nigeria). Online: http://www.comm.ecowas.int/.

ECOWAS. 2007c. "Office of the commissioner infrastructure - transport & telecommunication directorate: Telecommunications division." Online (06.07.2012): http://www.comm.ecowas.int.

ECOWAS. 2008a. "ECOWAS environmental policy." Abuja (Nigeria). Online (07.07.2012): http://www.comm.ecowas.int.

ECOWAS. 2008b. "ECOWAS private sector - investissement." Online (07.07.2012): http://www.privatesector.ecowas.int/.

ECOWAS. 2008c. "Investment policy framework and community investment code for ECOWAS region: Feasibility report: Project no. 2007/146261." Online: http://acpbusinessclimate.org/pseef/documents.

ECOWAS. 2008d. "Supplementary act a/sa.4/12/08 relating to the ECOWAS environmental policy: Thirty fifth ordinary session of the Authority of Heads of State and Government." Abuja (Nigeria). Online (07.07.2012): http://www.comm.ecowas.int.

ECOWAS. 2009. "ECOWAS trade and investment conference ('time for investment in West Africa is now'): Final conference report: Project no wp2.28.2-1.057." Online: http://www.acpbusinessclimate.org/PSEEF/Documents/.

ECOWAS. 2010a. "Follow-up meeting of the network of national anticorruption institutions in West Africa: Final communique." Online (06.07.2012): Online: http://www.comm.ecowas.int.

ECOWAS. 2010b. "Office of the commissioner political affairs, peace and security (paps): Political affairs directorate - description of activities: Documents on corruption, political parties, peacebuilding." Abidjan (Cote d'Ivoire) and Monrovia (Liberia) and Bamako (Mali). Online: http://www.comm.ecowas.int/.

ECOWAS. 2010c. "Regional strategic plan (2011 - 2015): A proactive mechanism for change." Abuja (Nigeria). Online (18.06.2012): www:spu:ecowas:int.

ECOWAS. 2010d. "Vision 2020: Towards a democratic and prosperous community." Abuja (Nigeria). Online: http://www.spu.ecowas.int/wp-content/uploads/2010/03/VISION-RFV-in-English-for-web.pdf.

ECOWAS. 2011a. "Environment and Water Resources Directorate-Work-Programme." Online (07.07.2012): www:comm:ecowas:int.

ECOWAS. 2011b. "Office of the commissioner macro-economic policy - multilateral surveillance directorate." Online (06.07.2012): http://www.comm.ecowas.int/dept.

ECOWAS. 2011c. "National anti-corruption institutions urged to maximize network: 054/2011, 05.04.2011." Porto Novo (Benin). Online (06.07.2012): http://news.ecowas.int.

ECOWAS. 2011d. "Technical committee meet to harmonize regional investment laws: 055/2011, 06.04.2011." Online (06.07.2012): http://news.ecowas.int.

ECOWAS. 2011e. "ECOWAS, AFD sign 12.34 m euros accord to boost food security, water resources management in West Africa: 092/2011, 03.06.2011." Online (06.07.2012): http://news.ecowas.int.

ECOWAS. 2011f. "USAID, partners boost ECOWAS trade liberalization scheme: 137/2011, 02.08.2011." Online (07.07.2012): http://news.ecowas.int.

ECOWAS. 2011g. "ECOWAS urged to set up coordinating unit for harmonization of educational programmes, qualifications: 143/2011, 08.08.2011." Online (06.07.2012): http://news.ecowas.int.

ECOWAS. 2012a. "ECOWAS Aid for Trade: Programmes." Online (04.07.2012): http://www.aidfortrade.ecowas.int/.

ECOWAS. 2012b. "ECOWAS private sector." Abudja. Online (04.07.2012): http://www.privatesector.ecowas.int/.

ECOWAS. 2012c. "Research and Statistics Directorate - Activities." Online (06.07.2012): http://www.comm.ecowas.int.

ECOWAS. 2012d. "ECOWAS sends 150 election observers to Senegal: 028/2012." Abuja (Nigeria), 21.02.2012. Online: http://news.ecowas.int.

ECOWAS. 2012e. "ECOWAS launches feasibility study on funding of transport, energy: 069/2012, 20.03.2012." Online (06.07.2012): http://news.ecowas.int.

ECOWAS. 2012f. "ECOWAS observation mission says Guinea Bissau presidential election was transparent: 066/2012, 20.03.2012." Bissau (Guinea-Bissau). Online (06.07.2012): http://news.ecowas.int.

ECOWAS. 2012g. "ECOWAS policy on science and technology adopted by ministers at 2nd conference: 086/2012, 24.03.2012." Online (06.07.2012): http://news.ecowas.int.

ECOWAS. 2012h. "ECOWAS partners move to set up regional investment guarantee/reinsurance mechanism: NÂ°: 133/2012." Abuja (Nigeria), 09.05.2012. Online (04.07.2012): http://news.ecowas.int.

ECOWAS. 2012i. "ECOWAS investment guarantee / reinsurance agency: Validation workshop of the feasibility study on the establishment of an ECOWAS investment guarantee/reinsurance agency, 04.07.2012." Online (09.07.2012): http://www.investmentguaranteesystem-ecowas.org/home.

ECOWAS. 2012j. "Workshop on ECOWAS trade liberalization scheme opens in Abuja: 182/2011, 26.09.2012." Online (07.07.2012): http://news.ecowas.int.

ECOWAS, and WAEMU. 2006a. "Regional integration for growth and poverty reduction in West Africa: Strategies and plan of action: A regional strategy paper prepared by the WAEMU commission and the ECOWAS executive secretariat." Abuja and Ouagadougou. Online: http://www.ecowas.int/publications/en/macro/srrp.pdf.

ECOWAS, and WAEMU. 2006b. "White paper for a regional policy: Geared towards increasing access to energy services for rural and periurban populations in order to achieve the millennium development goals." Niamey (Niger).

ECOWAS-TEN. 2011. "Missions et événements." Online (04.07.2011): http://www.ecowas-ten.com/web/node/2.

ECOWAS-TEN. 2012. "Rapport général de la réunion des parties prenantes de la chaine régionale de valeur de l'huile de palme sur le schéma de libéralisation des échanges." Online (04.07.2012): http://www.ecowas-ten.com.

ECREEE. 2010. "About ECREEE." Online: http://www.ecreee.org/.

Edi, Eric M. 2007. "Globalization and politics in the economic community of West African states." Durham and North Carolina: Carolina Academic Press.

Egger, Peter. 2000. "A Note on the Proper Econometric Specification of the Gravity Equation." Economics Letters, 66, pp. 25-31.

Egger, Peter. 2005. "Alternative Techniques for Estimation of Cross - Section Gravity Models." Review of International Economics, (13) 5, pp. 881-891.

Emmenegger, Patrick. 2011. "Job Security Regulations in Western Democracies: a Fuzzy-Set Analysis." European Journal of Political Research, 50(3): 336-364.

Engelhardt, Achim. 2010. "Impact Pathway." In Verfahren der Wirkungsanalyse. Ein Handbuch für die entwicklungspolitische Praxis, ed. Arbeitskreis "Evaluation von Entwicklungspolitik" DeGEval - Deutsche Gesellschaft für Evaluation, 72-87: Arnold-Bergstraesser-Inst.

Erdem, Ekrem, and Saban Nazlioglu. 2008. „Gravity Model of Turkish Agricultural Exports to the European Union." International Trade and Finance Association Conference Papers from International Trade and Finance Association, No 1126.

ERERA. 2012. "About ERERA." Accra (Ghana). Online (07.07.2012): http://www.erera.arrec.org/About-us.aspx.

Ergün, Nihal. 1991. "Mal ve Ülke Çeşitliliği Açısından İhracattaki Yapısal Değişim." DPT Uzmanlik Tezi, Yayin No: DPT: 2282-IPGM: 430, Ankara.

Erlat, Güzin, and Oguzhan Akyüz. 2001. "Country Concentration of Turkish Exports and Imports over Time", Economics Web Institutes.

Esfahani, Hadi Salehi, and Esra Ceviker Gürakar. 2013. "Fading Attraction: Turkey's Shifting Relationship with the European Union." The Quarterly Review of Economics and Finance, forthcoming 2013.

Eurostat. 2009. "Westafrika: Die ECOWAS." Online: http://epp.eurostat.ec.europa.eu.

EXPORT ACTORS FORUM. 2011. "Expect initiative - ECOWAS framework for export promotion & enterprise competitiveness for trade: Forum held the 05th to 07th December 2011. Cotonou (Benin)." Online: http://www.ecowas-eap.com.

Fisher, Louis M., and Alhaji S. Bah. 2010. "African Peace and Security Architecture (APSA): 2010 assessment study." Zanzibar (Tanzania).

Funnell, Sue C., and Patricia J. Rogers. 2011. "Purposeful program theory. Effective use of theories of change and logic models." Purposeful program theory.

Gaulier, Guillaume, and Soledad Zignago. 2010. "BACI: International Trade Database at the Product-Level." The 1994-2007 Version, CEPII Working Paper, N 2010-23, October.

Government of the Republic of Cape Verde. 2008. "Growth and poverty reduction strategy paper - ii: 2008_11." Online:http://www-wds.worldbank.org.

Government of the Republic of The Gambia. 2011. "Programme for accelerated growth and employment 2012-2015." Banjul and The Gambia. Online: http://www.mof.gov.gm/images/stories/pdf/GambiaPAGE2012.pdf.

Hausmann, Ricardo, Dani Rodrik, and Andrés Velasco. 2005. „Growth diagnostics." Online: http://www.hks.harvard.edu.

Head, Keith. 2003. "Gravity for Beginners." University of Columbia, Vancouver, Online document: http://faculty.arts.ubc.ca/nmalhotra/490/Articles/KHead%20 on%20gravity.pdf.

Head, Keith, and Thierry Mayer. 2002. "Illusory Border Effects: Distance Mismeasurement Inflates Estimates of Home Bias in Trade." Working Papers 2002-01, CEPII research center.

Head, Keith, and Thierry Mayer. 2014. "Gravity Equations: Workhorse, Toolkit, and Cookbook." Chapter to appear in the Handbook of International Economics, Vol. 4, eds. Gopinath, Helpman, and Rogoff, Elsevier.

Hounkpe, Mathias, and Ismaila Madior Fall. 2011. "Electoral commissions in West Africa: A comparative study." 2nd ed. Abuja (Nigeria): Friedrich Ebert Stiftung.

Huang, Ronggui. 2012. "QCA3: Yet another Package for Qualitative Comparative Analysis. R Package Version 0.0-5." http://cran.r-project.org/web/packages/QCA3/index.html. (accessed August 26, 2013).

Ianchovichina, Elena, and Susanna Lundstrom. 2009. "Inclusive growth analytics: Framework and application." Policy Research Working Paper(4851).

International Monetary Fund. 2013. Data retrieved August, 2013, from Direction of Trade Statistics (DOTS) online database.

Josheski, Dushko, and Mico Apostolov. 2013. "Macedonia's exports and the gravity model." MPRA Paper from University Library of Munich, Germany.

Karluk, Ridvan. 2002. "Avrupa Birliği ve Türkiye." Gelistirilmis 6. Baskı, Beta Basım, İstanbul.

Kennedy, Ryan, and Matt Dickenson. 2013. "Turkish Foreign Policy and Public Opinion in the AKP Era." Foreign Policy Analysis, 9(2): 171–188.

Krueger, Anne O., and Okan H. Aktan. 1992. "Swimming Against the Tide: Turkish Trade Reform in the 1980's." International Center for Economic Growth Publication, California.

Lall, Sanjaya. 1998. "Exports of Manufactures by Developing Countries: Emerging Patterns of Trade and Location." Oxford Review of Economic Policy, V. 14, No. 2, pp. 54–73.

Lavergne, Real. 1997. "Regional integration and cooperation in West Africa: A multidimensional perspective." Ottawa: IDRC and Africa World Press. Online (09.07.2012): http://idl-bnc.idrc.ca.

Ledermann, Simone. 2012. "Exploring Necessary Conditions for Evaluation Use in Program Change." American Journal of Evaluation(33): 159-178.

Lissovolik, Bogdan, and Yaroslav Lissovolik. 2006. "Russia and the WTO: The "Gravity" of Outsider Status." IMF Staff Papers, Vol. 53, No. 1, pp. 1-27, Published by: Palgrave Macmillan Journals.

Low, Patrick, Marcelo Olarreaga, and Javier Suarez. 1998. "Does Globalization Cause A Higher Concentration Of International Trade And Investment Flows?" World Trade Organization Economic Research and Analysis Division, Staff Working Paper ERAD-98-08.

Mason, Paul, and Marian Barnes. 2007. "Constructing Theories of Change: Methods and Sources." Evaluation, 13(2): 151-170.

Massell, Benton F. 1964. "Export Concentration and Fluctuations in Export Earnings: A Cross-Section Analysis." The American Economic Review, V. 54, No. 2, Part 1, ss. 47-63.

Ministère de l'Economie et des Finances de la République du Sénégal. 2009. "Enquête villages de 2009 sur l'accès aux services sociaux de base. Rapport final." Agence Nationale de la Statistique et de la Demographie; Cellule de Suivi du Programme de Lutte contre la Pauvreté (CSPLP).

Ministère de l'Economie et des Finances de la République du Sénégal. 2011. "Les Disparités géographiques de l'accès aux services sociaux de base au Sénégal. Enquête-villages 2000 et 2009." Agence Nationale de la Statistique et de la Demographie; Cellule de Suivi du Programme de Lutte contre la Pauvreté (CSPLP).

Moghaddam, Masoud, and Artatrana Ratha. 2011. "Turkey's trade potential and the EU's membership: evidence from a panel estimation of the gravity model." Journal of International Business and Economics 11(3).

Montenegro Claudio, and Raimundo Soto. 1996. "How Distorted is Cuba's Trade? Evidence and Predictions from a Gravity Model." Journal of International Trade and Economic Development, 5:1 p.45-68.

Nowak-Lehmann Danziger, Felicitas, Dierk Herzer, Inmaculada Martínez-Zarzoso, , and Sebastian Vollmer. 2005. "Turkey and the Ankara Treaty of 1963: What can Trade Integration Do for Turkish Exports." Center for European, Governance and Economic Development Research University of Goettingen Discussion Papers, Department of Economics, No 43.

Nowak-Lehmann Danzinger, Felicitas, Dierk Herzer, Inmaculada Martínez-Zarzoso, and Sebastian Vollmer. 2007. "The Impact of a Customs Union between Turkey and the EU on Turkey's Exports to the EU." Journal of Common Market Studies, vol. 45, issue 3, p.719-743.

Oh, Jinhwan, and Rashedur Rahman Sardar. 2013. "Gravity matters: International trade of Bangladesh." Review of Urban & Regional Development Studies, 25: 34–46.

Oh, Jinhwan, and Laxmi Prasad Prasai. 2012. "Does gravity matter? Evidence from Nepal's trade pattern." International Area Studies Review; 15(2): 161-175.

Owston, Ron. 2008. "Models and Methods for Evaluation." In Handbook of research on educational communications and technology. 3rd ed., ed. J. M. Spector, M. D. Merrill, Jeroen van Merriënboer, and Marcy P. Driscoll, 605-617. New York: Lawrence Erlbaum Associates.

Pawson, Ray, and Nick Tilley. 1997. "Realistic evaluation". London: Sage.

Pekin, Tevfik, and Temel Ergun. 1984. "Türk Dış Ticaretinde Yapısal Değişme." Ege Üniversitesi Basımevi, No:6, İzmir.

PERACOD. 2011a. "The Rural Electrification Senegal (ERSEN) Project: Electricity for over 90,000 persons. Factsheet."
https://energypedia.info/images/6/61/Rural_Electrification_Senegal_ERSEN_Project_Factsheet.pdf (accessed April 4, 2013).

PERACOD. 2011b. "The Rural Electrification Senegal (ERSEN) Project: Electricity for over 90,000 persons." Promotion l'Electrification Rurale et l'Approvisionnement en Combustibles Domestiques (PERACOD).

PERACOD. 2013. "Rural Electrification - Activities." Gesellschaft für Internationale Zusammenarbeit (GIZ). http://www.peracod.sn.

Polyakov, Evgeny. 2001. "Changing trade patterns after conflict resolution in the South Caucasus." Policy Research Working Paper Series from The World Bank, No 2593.

Ragin, Charles C. 1987. "The comparative method. Moving beyond qualitative and quantitative strategies." Berkeley: University of California Press.

Ragin, Charles C. 2000. "Fuzzy-set social science." Chicago: University of Chicago Press.

Ragin, Charles C. 2006. "Set Relations in Social Research: Evaluating Their Consistency and Coverage." Political Analysis, 14(3): 291-310.

Ragin, Charles C. 2008. "Redesigning social inquiry. Fuzzy sets and beyond." Chicago: University of Chicago Press.

Ragin, Charles C., and Benoit Rihoux. 2009. "Qualitative Comparative Analysis Using Fuzzy Sets (fsQCA)." In Applied social research methods series, Configurational comparative methods. Qualitative comparative analysis (QCA) and related techniques, ed. Benoît Rihoux and Charles C. Ragin. Los Angeles, Calif.: Sage.

Ragin, Charles C., and John Sonnett. 2005. "Between Complexity and Parsimony: Limited Diversity, Counterfactual Cases, and Comparative Analysis." In Vergleichen in der Politikwissenschaft. 1st ed., ed. Sabine Kropp and Michael Minkenberg. Wiesbaden: VS Verlag für Sozialwissenschaften.

Ragin, Charles C., and Lisa M. Amoroso. 2011. "Sociology for a new century series, Constructing social research. The unity and diversity of method." 2nd ed. Thousand Oaks: Pine Forge Press an imprint of SAGE Publications.

Ray, Debraj. 2008. "development economics." The New Palgrave Dictionary of Economics. Second Edition. Eds. Steven N. Durlauf and Lawrence E. Blume. Palgrave Macmillan, 2008. The New Palgrave Dictionary of Economics Online. Palgrave Macmillan. Online: http://www.dictionaryofeconomics.com.

Republic of Turkey. 2012. "Trade Agreements." Official Website of the Ministry of Economy. Online: http://www.economy.gov.tr.

Rihoux, Benoît, and Charles C. Ragin, ed. 2009. Applied social research methods series. Vol. 51, Configurational comparative methods. "Qualitative comparative analysis (QCA) and related techniques." Los Angeles, Calif.: Sage.

Rihoux, Benoît, and Gisele de Meur. 2009. "Crisp-Set Qualitative Comparative Analysis (csQCA)." In Applied social research methods series, Configurational comparative methods. Qualitative comparative analysis (QCA) and related techniques, ed. Benoît Rihoux and Charles C. Ragin, 33-68. Los Angeles, Calif.: Sage.

Rihoux, Benoit, Ilona Rezsöhazy, and Daniel Bol. 2011. "Qualitative Comparative Analysis (QCA) in Public Policy Analysis: An Extensive Review." German Policy Studies, 7(3): 9-82.

Robles, Maria D. P., Inmaculada, Martinez-Zarzoso, and Celestino Suarez Burguet. 2012. "The impact of FTAs on MENA trade." Ibero America Institute for Econ. Research (IAI) Discussion Papers from Ibero-America Institute for Economic Research, No 217.

Rogers, Patricia J., Timothy A. Hacsi, Anthony Petrosino, and Tracy A. Huebner. 2000. "Program Theory Evaluation: Practice, Promise, and Problems." In Program Theory in Evaluation Challenges and Opportunities: New Directions for Evaluation, ed. P. J. Rogers, Hacsi T. A., Petrosino A., and Huebner T. A., 5-13. San Francisco: Jossey-Bass.

Sager, Fritz, and Céline Andereggen. 2012. "Dealing With Complex Causality in Realist Synthesis. The Promise of Qualitative Comparative Analysis." American Journal of Evaluation, 33(1): 60-78.

Sager, Fritz, and Simone Ledermann. 2006. "Qualitative Comparative Analysis (QCA) und realistische Evlauation." In Rororo, Qualitative Evaluationsforschung. Konzepte - Methoden - Umsetzung, ed. Uwe Flick, 250-264. Reinbek bei Hamburg: Rowohlt-Taschenbuch-Verl.

Serin, N. 1981. "İhracatı Artırma Politikası." II.Türkiye İktisat Kongresi, Dış Ekonomik İlişkiler Komisyonu Tebliğleri, İzmir.

Seymen, Dilek 2009. "Türkiye'nin Dış Ticaret Yapısı ve Rekabet Gücü." DEU Yayınları, 1. Baskı, İzmir.

Shepherd, Ben. 2008. "Notes on the "Theoretical" Gravity Model of International Trade. UNESCAP (United Nations Economic and Social Commission for Asia and the Pacific)." Online: http://e.unescap.org/tid/artnet/mtg/gravity10_reading5.pdf

Sleuwagen, Leo, and Wim Dehandchutter. 1986. "The Critical Choice Between The Concentration Ratio And The H-Index In Assessing Industry Performance." The Journal Of Industrial Performance, V. 39, No. 3, pp. 193-208.

Sohn, Chan-Hyun. 2005. "Does the gravity model explain South Korea's trade flows?" Japanese Economic Review, 56: 417–430.

Spies, Julia, and Helena Marques. 2009. "Trade Effects of the Europe Agreements: A Theory-based Gravity Approach." The Journal of International Trade and Economic Development, V. 18, No. 1, pp. 11-35.

Stein, Danielle, and Craig Valters. 2012. "Understanding 'theory of change' in international development: A review of existing knowledge." The Asia Foundation and The Justice And Security Research Programme.

Tezel, Yahya Sezai. 1994. "Cumhuriyet Döneminin İktisadi Tarihi, Türkiye Araştırmaları, Tarih Vakfı, Yurt Yayınları." Third Edition, III.Baskı, İstanbul.

Thiem, Alrik, and Adrian Duşa. 2013. "SpringerBriefs in political science, Qualitative comparative analysis with R. A user's guide." New York, NY: Springer.

Tinbergen, Jan. 1962. "Shaping the World Economy: Suggestions for an International Economic Policy." New York: The Twentieth Century Fund.

Tirelli, Patrizio. 2010. "Growth and macroeconomic convergence in West Africa: Factor endowments, policies and institutions." UN Economic Commission for Africa, May 17, 2010. Addis Ababa: Ethiopia.

Tripathi, Sabyasachi, and Nuno Carlos Leitão. 2013. "India's Trade and Gravity Model: A Static and Dynamic Panel Data." MPRA Paper 45502, University Library of Munich: Germany

Togan, Subidey. 1994. "Foreign Trade Regime and Trade Liberalization in Turkey during the 1980s." Aldershot: Avebury, Ashgate Publishing Ltd.

Venables, William N., and Brian D. Ripley. 2002. "Statistics and computing, Modern applied statistics with S." 4th ed. New York: Springer.

Vogel, Isabel. 2012. "Review of the use of "Theory of Change" in international development." DFID.

Wagemann, Claudius, and Carsten Schneider. 2007. „Qualitative Comparative Analysis (QCA) und Fuzzy Sets." Ein Lehrbuch Für Anwender Und Jene, Die Es Werden Wollen: Barbara Budrich Esser.

WAGP. 2012. "Key milestones." Online (02.07.2012): http://www.wagpco.com.

WAHO. 2009. "WAHO - programs." Online (06.07.2012): http://www.wahooas.org.

WAPP. 2009. "Adopting the 2009 - 2012 WAPP business plan: 9th meeting of the executive board of the West African Power Pool Organisation: Resolution: WAPP/62/res.05/10/00." Cotonou: Executive Board of the West African Power Pool (WAPP). Online: http://www.ecowapp.org.

WAUTI. 2012a. "West African union of tax institutes - list of members." Abuja (Nigeria) and Accra (Ghana). Online (06.07.2012): http://www.wauti.org.

WAUTI. 2012b. "West African union of tax institutes (WAUTI): Communiqué on 1st international tax conference." Online (06.07.2012): http :==www:wauti:org=wauti=files=20:pdf.

Weiss, Carol H. 1972. "Evaluation research: methods for assessing program effectiveness." Englewood Cliffs, N.J.: Prentice-Hall.

Weiss, Carol H. 1997. "Theory-based evaluation: Past, present, and future." New Directions for Evaluation (76): 41-55.

World Bank. 2012. "World development indicators (WDI): Last update April 17, 2012." Online: http://databank.worldbank.org/ddp/home.do.

World Bank. 2013. Data retrieved June, 2013, from World Development Indicators Online (WDI) database.

World Trade Organization. 2013a. "Participation in Regional Trade Agreements." Data retrieved in the Regional Trade Agreements Information System (RTA-IS).

World Trade Organization. 2013b. "Preferential trade arrangements (PTA)." Data retrieved in the PTA Database.

WRCU. 2007. "Unité de coordination des ressources en eau de la CEDEAO." Online (06.07.2012): http://www.wrcu.ecowas.int/.