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North-South Trade Agreements and the Quality of Institutions: Panel Data Evidence*

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Abstract

Since 1990, not only the number of signed preferential trade agreements (PTAs) has increased, but also their depth. That means, PTAs include comprehensive rules, which go way beyond tariff reductions, such as property rights, competition or investment provisions. This paper argues that especially in North-South agreements there is a diffusion of institutional quality from developed to developing countries. First, a PTA may affect institutions because it can serve as a network for political exchange and second, the regulations and commitments stipulated in it may affect local institutions in the South. I empirically investigate if there are positive effects of being a member in a PTA on the quality of institutions in developing countries by accounting for the number and the depth of PTAs using the Design of Trade Agreements (DESTA) database, established by Dür, Baccini and Elsig (2014). I create a large panel data set covering 32 years to account for endogeneity of several controls. The results support the hypothesis that deep PTAs lead to an improved quality of institutions in the South. The results differ with respect to the type of agreement and region.

Keywords: Deep trade agreements, institutions, panel data

JEL Classification Codes: F13, F14, C23, C26

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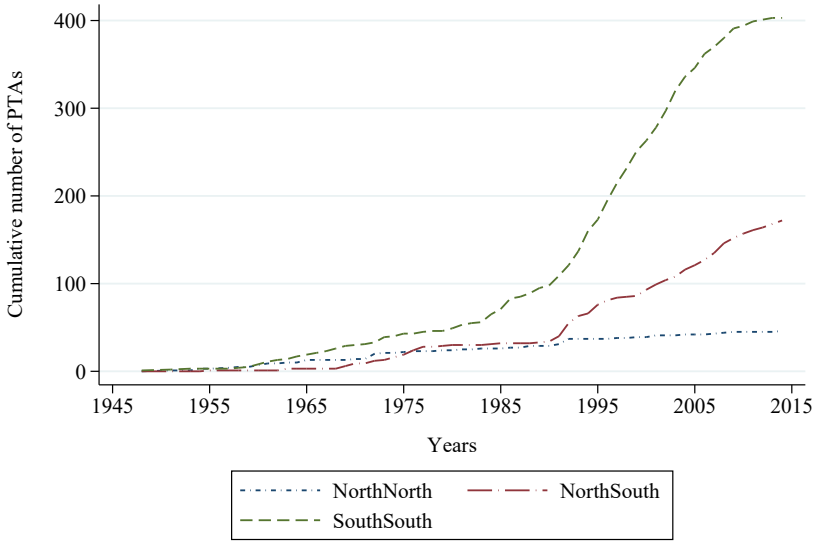
1 Introduction

Since the early 1990s, a surge in the number of preferential trade agreements (PTAs)[1], signed per year, can be observed. While there were 161 PTAs signed until 1990, the cumulative number of trade agreements increased to 621 agreements in 2015. Figure 1 shows the cumulative number of PTAs which have been signed since 1948 until 2015 by stance of development of the trading partners involved, i.e. between developed countries, North-North (N-N), between developing countries, South-South (S-S), and between developed and developing countries, North-South (N-S). The overall number has risen but especially N-S trade agreements (long-dashed line), and S-S trade agreements (short-dashed line) show the largest increases.

Figure 1: **Number of signed trade agreements by region**



Source: Author's calculations based on DESTA database.

What is the motive to enter a PTA? In the first place, regional integration happens due to economic reasons. Gaining market access is the traditional motive, as for example stated by Hillman and Moser (1996). In accordance to this, since the establishment of the General Agreement on Tariffs and Trade (GATT), which later became the World Trade Organization (WTO), tariffs have been decreasing on a multilateral level so that even developing countries enjoy tariff-free market access to important markets. Zero most-favored-nation (MFN) tariffs have lead to increased trade by developing countries (United Nations, 2013). On average, developed countries have lower levels than developing countries. But the latest WTO round of

[1]In this paper, PTAs are referred to all types of preferential trade agreements, including regional trade agreements.

negotiations, the Doha Round, which has started in 2001, has come to a halt, while regional integration continues to accelerate (Limão, 2016).

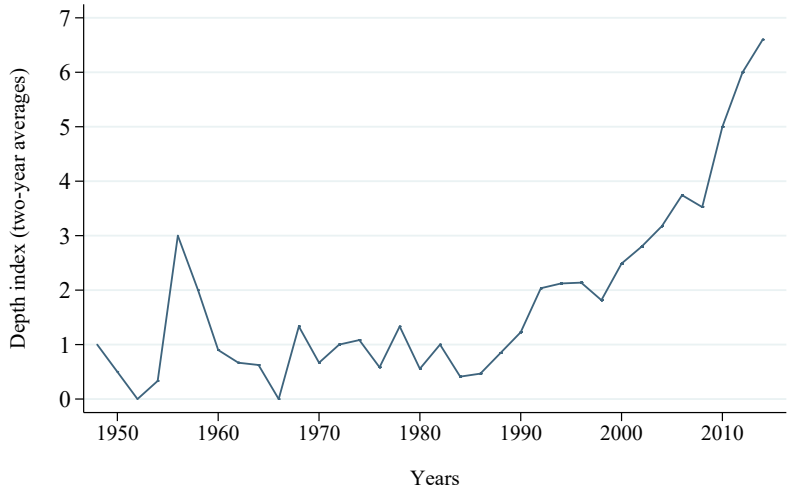
It seems that market access plays a more important role in symmetric agreements, that is in N-N and S-S relations. This can also be seen in the actual debate between the US and the EU and the US-President's threat to increase tariffs on EU products to gain more favorable trade terms. Freund (2004) argues that countries with similar cost structures are likely to require reciprocal trade liberalization to be self-enforcing. This is less the case in N-S trade agreements. She finds empirical evidence that reciprocity is important in symmetric trade agreements while there is only modified reciprocity in N-S trade agreements. North countries, in general, gain more market access compared to developing countries.[2] At the same time, developing countries already have good market access generated by the "Everything but Arms" (EBA) provision by the EU or the Generalized System of Preferences (GSP), where developing and least developed countries are provided additional tariff concessions, which do not fall within the scope of the most favored nation (MFN) principle. So this cannot explain the ongoing increase in signature rates of PTAs.

Besides the increase in the number of trade agreements, it can be observed that the newly signed PTAs tend to include a broader set of provisions, which go beyond at-the-border rules, like the reduction of tariffs, export subsidies or taxes and beyond WTO rules. There are "WTO+" rules, which expand or deepen existing WTO rules and countries define beyond-market-access commitments in areas, which do not directly affect trade flows, such as intellectual property rights, competition policy, anti-corruption and human rights, public administration, innovation policies, data protection and statistics and industrial cooperation (World Trade Organization, 2016, p. 129).

These commitments are behind-the-border rules and affect domestic policies. The more provisions are defined, which go beyond at the border rules, the deeper are the agreements. In other words, the depth of an agreement indicates the extend of the commitments, which the member states have bargained on. The more rules are specified in different areas of an agreement and the more those rules regulate the cooperation between the member states, the deeper is this agreement. Figure 2 shows the development of the mean depth of all signed trade agreements where data on depth is available. This measure is calculated on the basis of an additive index created by Dür, Baccini, and Elsig (2014), adding up the key provisions, which can be included in a PTA. One point is added if a PTA is more than a partial

[2] A ten percent reduction of a tariff in a developing country leads to a tariff reduction in the developed country of only 2 percent (Freund, 2004).

Figure 2: **Depth of trade agreements over time**



Mean depth index of all agreements where depth index is available. For the whole period in total 618 agreements are included.
Source: Author's calculation using DESTA database.

scope agreement or if it includes substantive provisions in one of the six areas: (1) services, (2) investments, (3) standards, (4) public procurement, (5) competition and (6) intellectual property rights. The index can range from 0 (when a PTA is only a partial scope agreement and does not include any provisions in one of the above areas) to 7 (for PTAs, which are more than a partial scope agreement and includes substantive provisions in all areas). A substantive provision is a definite regulation in one of the areas, while for example the desire to start trading in the services area is not treated as a substantive provision. So, while there has been a sideways movement to a higher number of PTAs there is a parallel movement to an increase in depth starting only slightly earlier in the mid 1980s.

The increased depth of PTAs provides additional motives for the formation of PTAs. One motive for developing countries, is that trade agreements have become an instrument to promote development. They intend to implement domestic reforms, which go beyond trade liberalization and import higher policy standards to foster growth. Schiff and Winters (1998) argue that developing countries might use PTAs to lock in policies because there is a higher credibility of enforcement in those agreements. Developing countries may chose a partner, who helps them to credibly promote policy agendas, accompanied by financial and knowledge transfers. Compared to multilateral agreements, PTAs offer less coordination effort and a targeted choice of a partner. Levy (2009) investigates the function of a PTA to increase a country's commitment to better governance by having a particular look at the United States-Peru Free Trade Agreement. Peru has gone through a period of very poor political

and economic management and thus has an urgent motive to achieve credibility in pursuing better policies and reforms. He finds that Peru was preferably interested in locking in policies instead of gaining market access, since it already had virtually free market access to the US. Interviews with Peruvian officials, academics and businessmen showed clearly that the agreement was expected to have a significant improvement on the rule of law and a better investment environment. This case study suggests that countries from the South sign PTAs with the North to promote the international attractiveness as well as domestic and foreign investment.

Also countries from the North aim at promoting the development process in countries from the South (Limão, 2016, p.50). They intend to improve institutions and governance in developing countries because the legal system in those countries is poor and often there are no secured property and human rights, missing democratic structures and courts, while political leaders are corrupt. Many RTAs contain regulations on pro-competitive practices, transparency, stronger anti-corruption and intellectual property rights, movement of capital and labor and investment. The North American Free Trade Agreement (NAFTA), for example, represents a very broad and far-reaching agreement with a depth index of 7. Besides chapters on trade in goods and technical barriers to trade, it contains chapters on investment, services, administrative and institutional provisions and intellectual property. Article 1110 of the investment chapter, for instance, interdicts expropriation of any investment of any party and regulates exceptions and compensations. The Cotonou Agreement on the other hand remains more general and only has a depth index of 1. It focuses on the aim to gradually remove all trade barriers, cooperate politically and promote dialog and poverty reduction without a concrete schedule. Article 17(2), for example, states that the agreement commits to the promotion of democratic processes through dialogue and consultation and to promote institutional reform. Still, this shows that PTAs now also serve as a promoter of institutions and political change.

The intention of this paper is to analyze whether trade agreements between North and South do affect the quality of institutions in the South. First, I argue that the membership in a PTA, without considering the depth, may improve institutions in the South because PTAs can serve as a platform where politicians can discuss policies and and interchange political experience and skills. Often political leaders in a developing country lack experience and skills when they come into position (Afegbua & Adejuwon, 2012). Especially African countries lack competent leaders (Adeyemi, 2017). One reason might be that patrimonialism is persistent (Acemoglu & Robinson, 2010) and new political leaders lack a previous political career. The exchange of knowledge is especially intensive in the period when the agreement is

negotiated, so already before it is actually signed and an effect should be seen in the period afterwards. Second, the deeper the agreement, the higher the improvement in institutional quality. That means, rules as, for example, defined in the investment chapter of NAFTA, might positively affect the institutional quality in the South. These rules compensate for missing institutions in the developing country, which are standard in the North.

In the literature, institutions play a prominent role in explaining economic performance and growth (Acemoglu, Johnson, & Robinson, 2001, 2005; La Porta, Lopez-De-Silanes, Shleifer, & Vishny, 1997; Rodrik, 2007) or trade pattern (Anderson & Marcouiller, 2002; Berkowitz, Moenius, & Pistor, 2006; de Groot, Henry L. F., Linders, Rietveld, & Subramanian, 2004; Nunn, 2007). Thus it is important to determine the factors of good institutions. The research on drivers of institutional change is growing. There are studies focusing on political factors of institutional change, such as free media (Brunetti & Weder, 2003; Norris, 2008) or foreign aid (Ear, 2007; Knack, 2004; Tavares, 2003) and on economic factors like trade (Busse, Borrmann, Fischer, & Gröning, 2007; Islam & Montenegro, 2002; Levchenko, 2013) or FDI (Larrain & Tavares, 2004; Pinto & Zhu, 2016). Most of those studies use cross-sectional data. The paper most closely related to the present analysis is Busse et al. (2007). They also investigate the effect of trade agreements on institutions but focus on the effects of NAFTA on Mexico and of the EU accession on the accessing countries, while I work with a comprehensive country sample. Furthermore they model the agreements as a single dummy variable, while the depth of the trade agreements plays a central role in my analysis.

For the analysis, I utilize the data set on "the design of trade agreements" (DESTA) by Dür et al. (2014) for measures relating to PTAs and the International Country Risk Guide (ICRG) to measure institutional quality. I create a data set including PTAs between North and South and concentrate on the effects on the institutional quality in the developing country. The use of a comprehensive data set allows for more general conclusions. Furthermore, I work with a panel data set covering a period of 32 years. The time dimension is useful in an econometric sense to correct for endogeneity and the long period of time includes more changes in the institutional quality, which only slowly develop. For the main explanatory variables I include the number of signed PTAs and the depth for each developing country and period.

I find that depth is an important driver, which positively affects institutional quality. However, the results differ with respect to the type of agreement and regions included.

As the literature on institutions suggests, institutions play an important role for

development and thus the analysis of factors of change in institutions may provide important insides for politicians of developing countries or developed countries who promote development abroad or for international organizations.
The rest of the paper proceeds as follows. The next chapter summarizes the related literature on the factors of change in institutional quality and outlines related work on learning and the diffusion of knowledge and political reform. The third chapter presents the estimation framework, the data used for the estimation, and the discussion of results. The final chapter concludes.

2 Related Literature

The related empirical literature on the factors of change in institutions sheds light on important control variables to be included in the empirical analysis. Furthermore, the literature on learning provides an intuition why PTAs are a suitable instrument to transfer knowledge and experience.
An important part of the related literature reveals the critical factors of institutional quality, which need to be included in the empirical analysis. It can be seen that most of the related empirical literature uses cross-sectional data. Factors of change can broadly be divided into political, social, geographic and economic factors. One strand of the cross-sectional literature relate the initial conditions of a country to its subsequent level of institutional quality. These studies explain why institutions in some countries are well-developed, while in other countries institutions are weak. Acemoglu et al. (2001), for example, use settler mortality rates and other controls (latitude, climate, religion and natural resources) to explain the level of current institutional quality. European colonialism is also linked to differences in institutional quality by referring to the associated legal system. La Porta et al. (1997), Straub (2000) and Chong and Zanforlin (2000) analyze the effects of different legal origins on the quality of institutions and find that inferior institutions are developed in countries with a French legal origin, where the government is much more interventionist and investor protection is weakest. La Porta, Lopez-De-Silanes, Shleifer, and Vishny (1999) also show that ethnic heterogeneity is related to poor institutions.
However, these factors do not explain how institutions change over time and thus are inappropriate for the empirical analysis over time. Important drivers of institutional quality, which include a time dimension are mainly political and economic ones. The freedom of the press as, for example, revealed by Norris (2008) and Brunetti and Weder (2003), is an important political driver. Foreign aid is also analyzed as a factor of change in a number of papers but its effect is inconclusive. While Tavares

(2003) results indicate that foreign aid has a positive effect on corruption, meaning a reduction of corruption, Knack (2001), Ear (2007) and Djankov, Montalvo, and Reynal-Querol (2008) find a negative effect of aid on different measures of institutions, including corruption. With respect to economic determinants, empirical work focuses on openness and FDI, which are often related to corruption. The effects of FDI on institutions do not show clear results. Larrain and Tavares (2004) and Okada and Samreth (2012) study the effects of FDI on corruption and show that FDI reduces corruption, while Pinto and Zhu (2016) also account for the development level of host countries, which reveals that FDI increases corruption in least developed countries while there are no effects resulting from FDI in all remaining countries. Ades and Di Tella (1999) and Wei (2000) show that more open economies tend to have lower corruption levels due to higher competition. Busse et al. (2007); Giavazzi and Tabellini (2005); Islam and Montenegro (2002); Rigobon and Rodrik (2005) find a positive and significant effect of openness on different measures of institutions. But Knack and Azfar (2003) show that the results for openness are very sensitive to the choice and number of countries. For data sets including more countries than those used by other authors the effect of openness is no longer present. In all studies, income and population size represent essential further control variables for institutional quality, which change over time. Busse et al. (2007), Gassebner, Gaston, and Lamla (2011) and Quazi and Alam (2015) add to the literature by including the time dimension in their empirical work. These panel studies add human capital and political freedom as further controls, which change over time.

Another part of the related literature focuses on the diffusion of knowledge and policies between economies and provides intuition for the link between trade agreements and institutional reform. First, it is stated, for example, by Islam and Montenegro (2002) that policies can diffuse from one country to another, especially when countries trade with each other. They argue that the risk that arises from trading with unknown partners increases the incentive to improve domestic institutions as domestic and foreign firms demand for reform. Then, open economies learn from trading partners where successful and effective institutions are implemented. Second, Simmons, Dobbin, and Garrett (2006) explain this process of learning by the theory of Bayesian updating and outline the factors, which play a role for successful transmission of knowledge or reform. They explain that learning from other economies is based on the successful outcome of policies abroad, which is then transferred to the domestic country. The success of this transmission depends on the availability of information on the outcome and the expertise and experience to evaluate the information. The diffusion of policies is more effective, the closer countries are

linked to each other so that a better communication is possible. By signing trade agreements, countries intensify their relationship and facilitate communication for a better exchange of knowledge.
Empirical evidence for the diffusion of reforms is provided by Gassebner et al. (2011), who study whether implemented economic reforms in one country affect the reforms in other countries. They find empirical support for reform spillovers and furthermore, find that trade itself is not promoting diffusion of political reform while cultural and geographic proximity are important drivers. The positive effect of spacial proximity for learning is supported by the results of Mancusi (2008) who analyzes the effect of knowledge spillovers on innovation on a sectoral level. She finds evidence that knowledge spillovers are fostered due to technical and spacial proximity between source and recipient. These results show that spatial proximity promotes the ability of spillovers and supports the argument that trade agreements promote these effects. PTAs can serve as a communication network where information and knowledge is exchanged. When countries negotiate on a PTA, spatial proximity is reduced and knowledge exchange is possible.

3 Empirical Analysis

3.1 Data

The purpose of this study is to analyze the impact of trade agreements between North and South on the quality of institutions in the South over the period of 1984 until 2015. To account for the effects of the sole membership in a PTA I introduce the number of PTAs, signed by a country from the South.[3] To capture the effects of the depth of PTAs, I use the additive index from DESTA, which measures the amount and extent of commitments included in a PTA. As noted above, there are important other determinants of the quality of institutions, which I include as further controls. For the choice of controls, I refer to the related literature on the determinants of institutional change with a focus on those determinants, which change over time. These controls include income, population, education, freedom of the press and the presence of conflicts.

[3]In the Appendix, I include a list of all North and South countries, as well as a description of all variables and sources.

3.1.1 Dependent Variable

The measure for the quality of institutions comes from the International Country Risk Guide (ICRG) database. There are further available measures for institutions, like the World Governance Indicators (WGIs) by the World Bank or the Economic Freedom of the World (EFW) Index by the Fraser Institute. But the ICRG data set is the most comprehensive data set covering 141 countries and starting in the year 1984. It includes the largest number of observations without gaps.

Table 1: Political Risk Components

Component	**Points (max.)**
Government Stability	12
Socioeconomic Conditions	12
Investment Profile	12
Internal Conflict	12
External Conflict	12
Corruption	6
Military in Politics	6
Religious Tensions	6
Law and Order	6
Ethnic Tensions	6
Democratic Accountability	6
Bureaucracy Quality	4
Total	100

The ICRG data set measures the risk of a country in three categories, political, financial and economic risk. Each category consists of components, which are added together to an index for each category and finally to an overall risk rating for each country. To achieve consistency of the rating between countries and over time, a number of basic questions are predefined to create the index. All categories consist of several components, which have a minimum value of zero, indicating the highest risk and the maximum value indicating the lowest potential risk. The maximum values, varying from 4 to 12, represent the importance with respect to the overall risk, measured for each category. Table 1 lists the 12 components of the Political Risk rating and its maximum points, adding up to a total score of 100 points. While "Bureaucracy Quality" for example is assessed least important with 4 maximum points, "Government Stability", "Socioeconomic Conditions", "Investment Profile",

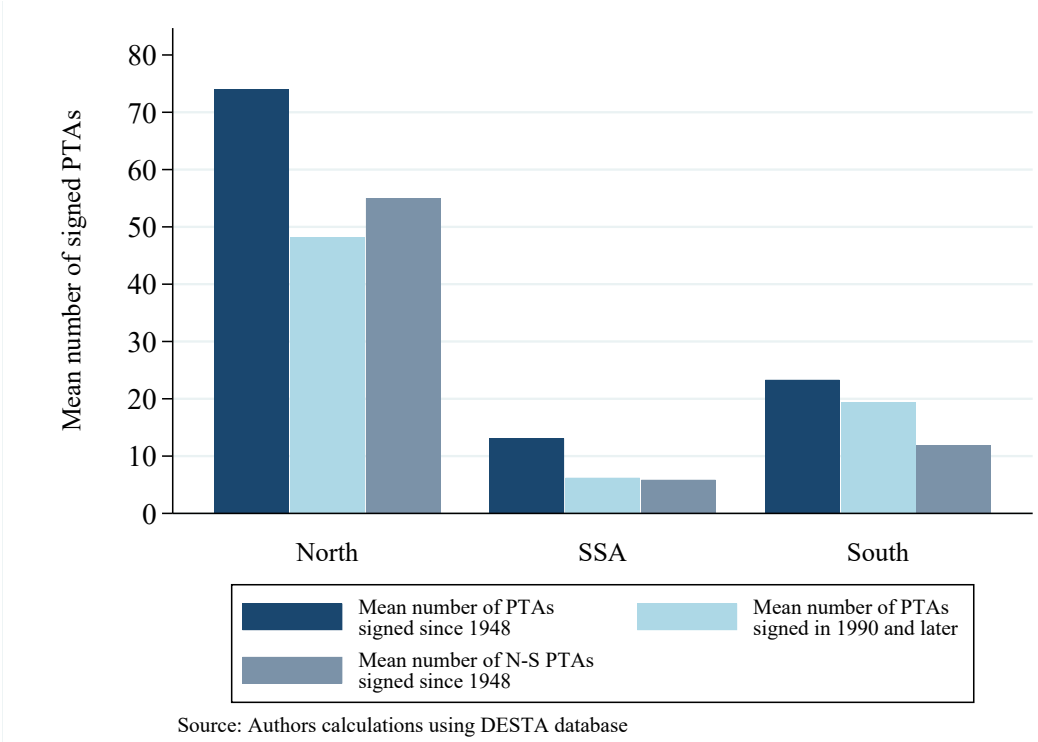
"External Conflict" and "Internal Conflict" are considered most important with a maximum of 12 points, when assessing the overall risk.
In this analysis the Political Risk component "Investment Profile" is used to measure the institutional quality. It accounts for institutional aspects, which are particularly important with regard to trade or foreign direct investment and consequently are expected to be affected by trade agreements and their contents. It measures the general risk to investment and is composed of three sub-components. One component is "Contract Viability/Expropriation", which quantifies the potential risk that any contracts are modified or completely canceled or the risk that foreign owned assets are expropriated. This reflects an important risk for exporting firms, having contracts with foreign firms or for investors, investing in foreign countries. Another component measures "Profits Repatriation". This component assesses how well profits can be transferred out of the host country and thus also evaluates the bureaucratic efficiency, the banking system and exchange controls, all of which are aspects, trading firms and foreign investors have to deal with. The third component, measures "Payment Delays", which is also affected by a poor banking system and an inefficient bureaucratic system. In addition, this component assesses other factors, which influence delays in payments, like foreign exchange position and formal and informal government policies or motivations. The overall component sums up over the sub-components and has a maximum score of 12 points.

3.1.2 Data on Trade Agreements

For measures related to trade agreements, i.e. for the number of PTAs signed and their depth, the DESTA database Dür et al. (2014) is used. The data set not only provides a comprehensive list of trade agreements, but also includes detailed information on various characteristics of each agreement, especially on the scope of the specified provisions, (i.e. the depth of an agreement). In the most recently available data set, a total number of 810 trade agreements are listed in DESTA over a period between 1948 and 2015. Detailed information on the depth of trade agreements and other information like the type of agreement in terms of integration level, membership (i.e. bilateral, plurilateral, plurilateral-bilateral, etc.), number of member states, regional dummies, and information on the language is available for 618 PTAs. Furthermore, for each PTA, all member states are listed, which is required to get country-level data. To create a variable that counts the number of signed PTAs for each country and year, the data was transformed accordingly. In a next step, for each country the cumulative sum of signed agreements in each year was calculated. There are some countries, who have already signed PTAs before the

first period, which is covered in this analysis. So not all countries start with zero PTAs.

Figure 3: **Number of PTAs signed on average by a country from different regions between 1948 until 2015**

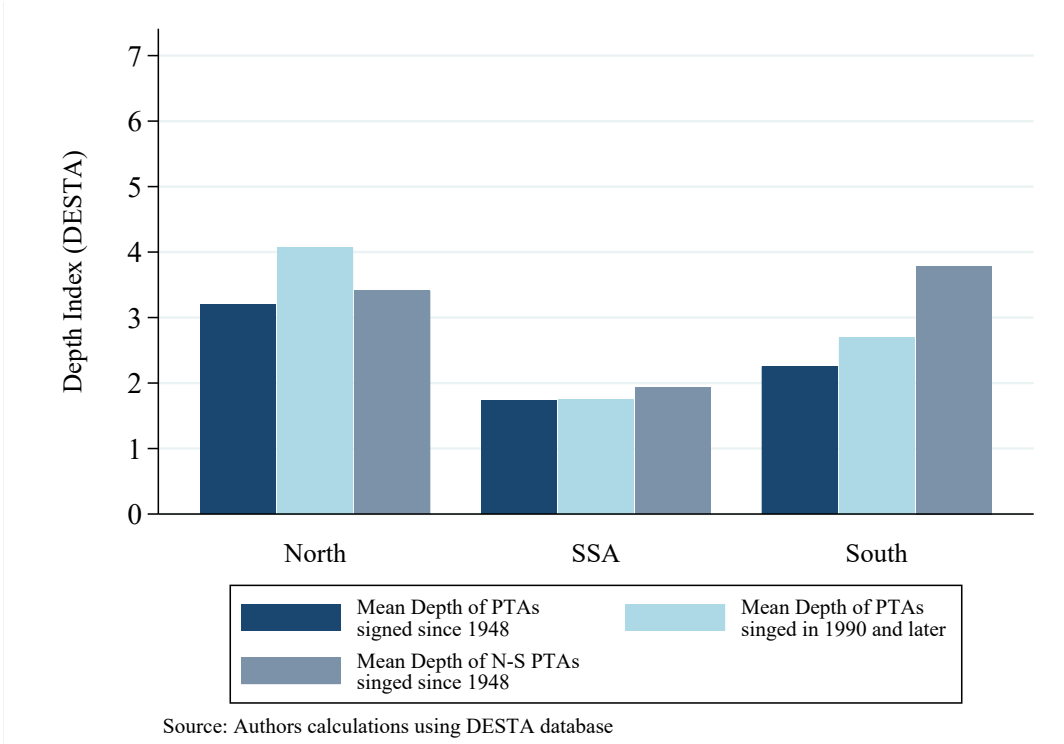


Source: Authors calculations using DESTA database

Figure 3 shows the number of PTAs, countries with a different status of development or from different regions (North, South or SSA) have signed on average (1) over the whole period included in the DESTA data set, which means since 1948 (dark blue bar), (2) since 1990, the period when the overall signature rates of trade agreements increases (light blue bar), and (3) all PTAs, signed only between North and South (N-S) since 1948 (mid blue bar). South includes all countries from the South excluding countries from Sub-Sahara Africa (SSA). SSA plays a specific role as it performs poorly in economic and political development compared to other developing countries. Its role is discussed in more detail in chapter 3.3. It can be observed that, on average, countries from the North sign most PTAs compared to countries from the South and that Sub-Sahara African countries on average sign less PTAs than other developing countries. Furthermore, the figure shows that for North and South most of the PTAs were signed since 1990. Only for SSA this trend is not identifiable. For a developing country (excluding SSA), about half of the signed PTAs is with a country from the North. This reveals that N-S PTAs depict a substantial part of PTAs for the South.

For the depth of a PTA, the additive depth index from DESTA is used.[4] The index consists of seven subordinate variables, which take values of either zero or one. The first variable takes the value one, if the agreement is more than a partial scope, i.e. if the agreement is a full free trade agreement and zero otherwise. The other six variables indicate whether the agreements contain substantive provisions in the areas (1) services, (2) investments, (3) standards, (4) public procurement, (5) competition and (6) intellectual property rights by a value of one or zero if this is not the case. So if an agreement includes substantive provisions in all areas and foresees the elimination of all tariffs, the value for the depth index adds up to seven. Since there are many countries, which have signed several PTAs per year, the mean of the depth index is calculated for each year.

Figure 4: **Mean Depth by region over all PTAs included in DESTA (since 1948) and over all PTAs signed since 1990**



Source: Authors calculations using DESTA database

Figure 4 shows, again for North, South and SSA, the mean depth of signed PTAs since 1948 (dark blue bar), since 1990 (light blue bar) and of N-S PTAs since 1948 (mid blue bar). It reflects that, on average, PTAs signed after 1990 are deeper compared to all PTAs signed since 1948. But this is only the case for North and

[4]DESTA also provides a second measure of depth, using a latent trait analysis, which was conducted for binary data. As in the following analysis binary data is not used, the additive index is applied as a measure of depth

South but not for countries in SSA. Furthermore, N-S PTAs are, on average, deeper compared to other PTAs. Especially, when looking a countries from the South, agreements signed with the North are distinctly deeper, with an average index of almost 4, than the average depth index of all agreements signed since 1948, which takes a value slightly above 2. This suggests that potential effects of deep trade agreements are expected to be present especially in N-S PTAs.

3.1.3 Further controls

Further explanatory variables are the number of armed conflicts, freedom of the press, income, population, inflation and education. These controls are relevant in this context and have been investigated in related empirical studies.

Conflicts are expected to affect institutions negatively. To measure conflicts, the UCDP Monadic Conflict Onset and Incidence data set from the Uppsala Conflict Data Program (UCDP) and the Study of Civil War at the International Peace Research Institute in Oslo (PRIO) is used. This data set is a country-year version of the UCDP/PRIO Armed Conflict data set v.4-2014, which is structured for a quantitative analysis. For this analysis, I use a variable, which measures the incidence of at least one active intrastate conflict as a dummy for each country-year. Intra-state conflicts refer to all conflicts between a government and a non-governmental party without intervention from other countries, which result in no less then 25 battle-related deaths per year.

Data on the press freedom is taken from Freedom House. It measures the degree of press freedom in three categories, i.e. no press freedom (taking the value 0), partly free (taking the value 1) or completely free (taking the value 2). I expect that a higher press freedom positively affects the level of institutional quality as it can reveal bad institutions and inform the public about missing rules or the violation of rules and how institutions can be improved.

For income, education and population, I use data from the World Bank. Income is measured as the log of GDP per capita in current US dollars. Data is available for the period between 1960 and 2015 for 217 countries (World Bank, 2016). For income, I expect a positive effect on institutions as with a higher available income, people demand better institutions, and at the same time, more financial resources are available to build them up.

Population is measured by the size of a country, which I measure as the total number of people in million for each country. The effects on institutional quality are ambiguous. On the one hand, in a larger country it might be more likely to push through reforms and necessary rules, as it has a critical financial mass. On the other

hand, a larger population increases transaction costs and ethnic conflicts might be more intensive, which constitutes a burden on the ability to promote institutions. Years of schooling are used as a proxy for education. I expect a positive effect on the quality of institutions, since a well-educated population has a higher interest in political participation and reform and will demand good institutions.

3.2 Estimation Framework

The final data set includes 123 countries, 101 Southern and 22 Northern countries, over 8 periods starting from 1984 until 2015. To analyze long term effects and to reduce business cycle effects, 4-year averages are used. For the estimation framework, I stick closely to the related empirical literature analyzing the effects on institutions. I estimate the effect of the number of PTAs and the depth of PTAs on the quality of institutions in a linear dynamic panel model using the following baseline equation:

$$INST_{it} = \beta_1 INST_{i,t-1} + \beta_2 PTAs_{i,t-1} + \beta_3 Depth_{i,t-1} + \beta_4 PTAs_{i,t-1} * Depth_{i,t-1} + \gamma' X_{it} + \delta_t + \mu_i + \varepsilon_{it} \quad (1)$$

The dependent variable, $INST_{it}$, measures the quality of institutions of country i in period t. A lagged dependent variable, $INST_{i,t-1}$, is included to capture the persistence of institutional quality since only small adjustments are possible in one period and a process of adaption is needed to implement better institutions. That is, if the quality of institutions is low in the former period, a country will not be able to improve institutions to a high level immediately in the next period.
The main explanatory variables are $PTAs_{it}$, indicating the cumulative number of trade agreements, which a country has signed until period t and $Depth_{it}$, measuring the mean depth of all agreements signed until period t. Furthermore, an interaction term of the two variables $PTAs_{it} \times Depth_{it}$ is included to test if the effect of one of the variables differs if the value of the other one changes. It could be, for example, that the more trade agreements a country has signed, the larger or smaller the effect of depth might be. Similarly, the deeper trade agreements are, the greater might be the effects of the number of signed PTAs. X_{it} includes a number of time-varying control variables, which are commonly used in the literature as determinants of institutional change. μ_i represents individual specific effects (here country fixed effects) and δ_t denotes time dummies for all periods. Finally ϵ_{it} is the idiosyncratic error term, capturing all other omitted factors.
Estimating this equation using pooled ordinary least squares (OLS) will lead to bi-

ased results as the lagged dependent variable correlates with the individual specific effect, which is part of the error term, i.e. $E(\mu_i|Y_{it-1}) \neq 0$ which is referred to as the "dynamic panel bias" or "Nickell-bias" (Nickell, 1981). This makes OLS inconsistent and leads to an upward bias in the coefficients. Furthermore, results are biased due to other endogenous variables.

Most explanatory variables are likely to be endogenous. There are two potential sources of endogeneity. First, endogeneity may arise from omitted variables bias. The inclusion of country fixed effects deals with this source of endogeneity. Second, endogeneity arises due to simultaneity. The number of PTAs is potentially endogenous with respect to β_1 and β_2 because of reverse causality arising from the quality of institutions, which are not only affected by the number of PTAs but, which might affect the number of PTAs itself. North countries might want to sign more PTAs with countries, which have a higher level of institutional quality. This problem of reverse causality might also occur with respect to the depth of PTAs since the level of institutional quality in the South might affect how deep a PTA is. If institutions are poor in the Southern country, a trading partner from the North may seek to compensate for missing institutions by forming a deeper PTA to protect domestic firms. The other control variables, namely income, freedom of the press and conflicts are also expected to be endogenous due to simultaneity. Obviously, if institutions are poor and there are no rules defined which secure (physical and intellectual) property, this also produces a risk to the freedom of the press and may also result in conflicts.

Acemoglu et al. (2005) argue that institutions are a source of economic growth. In endogenous growth models it is the amount of resources allocated to innovation, which explains differences in income. Innovation activities highly depend on property rights. If property rights for the technology of the innovation are not secured, there are no incentives for innovation.[5] And if there are secure property rights, this depends on the implemented institutions. So institutions also affect income. Empirical evidence for a causal relationship of institutions on growth is provided, for example by Dollar and Kraay (2003), Glaeser, La Porta, Lopez-De-Silanes, and Shleifer (2004) and Levine (2005).

Education and population are assumed to be exogenous. Education is not expected to be endogenous because the current level of institutions may only affect the educational system of future periods and then primarily the part of pupils, newly entering school but less those who are already enrolled in school and it should not have any

[5]See also North (1990) for a detailed discussion of the importance of institutions for economic development.

effect on the current educational system.[6]

The difference generalized method-of-moments (GMM) estimator, proposed by Holtz-Eakin, Newey, and Rosen (1988) and Arellano and Bond (1991) as well as the system GMM, developed by Arellano and Bover (1995) and Blundell and Bond (1998) address the above noted problems. The estimator is constructed for linear dynamic panel equations with a small number of periods and a large number of individuals, a dynamic dependent variable, which is influenced by its past values, further endogenous explanatory variables, fixed individual effects and heteroscedasticity and autocorrelation within individuals but not across them (Arellano & Bover, 1995; Blundell & Bond, 1998). Furthermore, it is assumed that the only instruments available are internal, i.e. they are based on lags of the instrumented variables. This is an important characteristic as it appears to be very difficult to find suitable instruments for endogenous variables from outside the model. These instruments have to be highly correlated with the endogenous variables, but at the same time, they need to be uncorrelated with the quality of institutions and to vary over time. The model to be estimated takes the following general form of an autoregressive panel data model, which is used to explain the estimation framework:

$$y_{it} = \alpha y_{i,t-1} + \gamma X_{i,t-1} + \zeta X_{it} + \mu_i + \varepsilon_{it} \tag{2}$$

The basic idea which is incorporated in the difference GMM is to remove the individual fixed effects and thus the potential for omitted variable bias by taking first differences as in equation (3). By this transformation, the lagged dependent variable $\Delta y_{i,t-1} = y_{i,t-1} - y_{i,t-2}$ is still related to the error term $\Delta\varepsilon_{it} = \varepsilon_{it} - \varepsilon_{i,t-1}$ via the terms $y_{i,t-1}$ and $\varepsilon_{i,t-1}$ and thus needs to be instrumented. But now $\Delta y_{i,t-2}$ and $y_{i,t-2}$ become valid instruments, which are related to the lagged dependent variable but not to the error term as long as the errors are not serially correlated. Other explanatory variables also remain endogenous and need to be instrumented by their lags. After instrumenting, the transformed equation can be estimated using GMM.

$$\Delta y_{it} = \alpha \Delta y_{i,t-1} + \gamma \Delta X_{i,t-1} + \zeta \Delta X_{it} + \Delta\mu_i + \Delta\varepsilon_{it} \tag{3}$$

This estimation is performed by creating a system of equations of moment conditions as in equation (4), which indicates that all instruments are uncorrelated with the errors. With z being a vector of j instruments, there is a system of equations equal to the number of instruments.

[6]For example, the German schooling system had a reform, where pupils could earn the diploma "Abitur" after 12 years instead of 13 years. But this affected only pupils newly entering high school and it took at least another 8 years until the first students graduated (Huebner & Marcus, 2017).

$$E(\varepsilon|z) = 0 \tag{4}$$

If there are more instruments, i.e. more equations than parameters to be estimated, in general, there is no solution. The system is over-identified and usually all moment conditions cannot be satisfied. The GMM estimator now estimates equation (3) by minimizing the vector $E_N(z\varepsilon)$ of N observations, that is, forcing the empirical moments as close to zero as possible. For this minimization problem, the one-step GMM estimator defines a weighting matrix, which weighs each moment condition. That means, in the optimal case, large weights are provided to moments with small variances, while instruments with large variances are deemphasized by smaller weights. Through this procedure, the information from instruments with relatively small variances is not lost. In infinite samples the GMM estimator is consistent and efficient.[7] So when N increases the weighting matrix converges to the optimal matrix. But as the sample size is limited, the instruments are expected to correlate at least slightly with the endogenous part of the regressors. So in a finite sample it is crucial not to include too many instruments.

Estimating GMM using a second step can lead to a gain in precision. The two step GMM estimator uses the estimated residuals from the first step to create a covariance matrix of estimated residuals and then does the GMM estimation again. In difference GMM, two step GMM generally leads to lower bias and lower standard errors compared to one step GMM. But in small samples, the two step estimator can produce severely downward biased standard errors, which indicate a deceptive precision. This is due to the second step, where the efficient weight matrix is constructed using parameter estimates without accounting for their variability. Windmeijer (2005) derives a small-sample correction term, which corrects for the extra variation in a small sample.

Blundell and Bond (1998) find that in small samples, which include a persistent and short time-series the results of the difference GMM contain a small sample bias and lose precision. As already suggested by Arellano and Bover (1995), one reason is that lagged levels incorporate little information about future changes if the dependent variable is close to a random walk and thus lagged levels are poor instruments for differenced endogenous regressors. They are the first to propose the use of lagged differenced instruments for the levels equation. Blundell and Bond (1998) show that additional moment conditions for the levels equation, which create a system of equations, contain information even when data is persistent and instruments for the first-difference transformed equation are poor. They formalize necessary

[7] See Hansen (1982).

assumptions to instrument endogenous variables in the levels equation. The additional moment conditions indicate that changes in any instrumenting variable z are orthogonal to the individual specific effects μ_i: $E(\Delta z_{it}|\mu_i) = 0$. As long as the ε_{it} are not serially correlated $\Delta z_{i,t-1} = z_{i,t-1} - z_{i,t-2}$ can be used as an instrument for the endogenous variable $z_{i,t-1}$, which does not correlate with the idiosyncratic error ε_{it} in the levels equation. As the levels equation still includes fixed effects, the assumption that the change in the instrumenting variable Δz_i is orthogonal to the fixed effects, μ_i, is not obvious. But Blundell and Bond (1998) show that under certain conditions this assumption is satisfied. They show that the initial conditions process of the data, generating the dependent variable, is crucial. In the long run, based on μ_i, the initial value of a dependent variable y in a simple auto-regressive model, where the coefficient of the lagged dependent variable is smaller than 1, y_{i1} converges to $\mu_i/(1-\alpha)$ with ε_{it} indicating the deviation from this long-run level: $y_{i1} = \mu_i/(1-\alpha) + \varepsilon_{it}$. Then, the necessary assumption is fulfilled if the deviation from the long-run level is not correlated with the level itself. In other words, the assumption holds if the original series have a constant correlation over time with the individual specific effects, also referred to as the "mean stationarity" assumption.
However, the performance is reduced if the coefficient of the lagged dependent variable approaches unity. When the constant correlation assumption is violated, taking first differences does not completely remove the unobserved individual-specific effect and lagged differenced instruments for the levels equation will not be exogenous anymore. As a result, the system GMM will not be valid anymore. In general, the Sargan or Hansen test statistic provide information on the validity of used instruments. Details on the appropriate range, which suggest the validity of instruments are given in the following chapter, where the results are discussed.
Using system GMM, the two-step estimator is, in general, more efficient than one-step, when Windmeijer (2005) corrected standard errors are applied. Then the standard covariance matrix is robust to panel-specific autocorrelation and heteroscedasticity. Taking the efficiency gains of the system GMM into account, the two-step system GMM is used for the analysis. In the two-step GMM estimates, the Windmeijer (2005) finite sample correction for standard errors is employed. To test appropriate lags as instruments for each endogenous variable, first stage regressions were implemented for all endogenous variables and lags. All results are presented in the following section.

3.3 Results

A useful check for the GMM estimation are the estimation results from OLS and within transformation, which can be interpreted as a bound for the true estimate of the lagged dependent variable (Bond, 2002). While the OLS estimate is upward biased, the estimate resulting from the within transformation is downward biased as it does not remove the dynamic panel bias completely. As the within transformation subtracts the mean of each variable over all periods, the transformed terms still include parts of the lagged dependent variable, which are correlated with the error term. The true parameter estimates should lie within the range of the coefficients of OLS and the within transformation.

Table 2: **Comparison of system GMM results with OLS and FE**

	(1) OLS	(2) FE	(3) sysGMM
INST (t-1)	0.492***	0.293***	0.433***
	(0.038)	(0.035)	(0.062)
Ln(Population)	0.053	-0.426	0.099
	(0.034)	(0.438)	(0.082)
Ln(GDPpc)	0.367***	0.874***	0.525***
	(0.053)	(0.294)	(0.140)
Press Freedom	0.216***	0.009	0.156
	(0.070)	(0.164)	(0.197)
Conflicts	-0.257*	-0.193	-0.490
	(0.149)	(0.328)	(0.438)
Education	-0.006	-0.004	-0.010
	(0.004)	(0.007)	(0.007)
Obs.	493	493	493
Countries		87	87
No. Instruments			77
Lags			t-3, t-4, t-5
AB(2) p-value			0.021
AB(3) p-value			0.944
Hansen p-value			0.227

(i) Robust standard errors in parentheses
(ii) Significance at the 10, 5, and 1 percent level is denoted by *, ** and ***, respectively.
(iii) All models include year fixed effects.

In a first step, the quality of institutions is regressed on the lagged dependent variable and the main controls, which earlier empirical studies proved to be significant determinants of institutions, namely, the natural logarithm of population, the natural logarithm of GDP per capita (income), press freedom, conflicts and education. I implement three different estimations using the OLS estimator (OLS), the within estimator (FE) and the system GMM estimator (sysGMM). The results are reported in table 2.

The estimate of the lagged dependent variable, 0.433, lies within the bound of the OLS and FE (0.492 and 0.293, respectively) and is significant at the one percent level. So system GMM can be applied as a consistent and efficient estimator.

While first order serial correlation in differenced residuals is expected, as $\Delta\varepsilon_{i,t} = \varepsilon_{i,t} - \varepsilon_{i,t-1}$ and $\Delta\varepsilon_{i,t-1} = \varepsilon_{i,t-1} - \varepsilon_{i,t-2}$ both contain $\varepsilon_{i,t-1}$, the p-value of the Arellano-Bond test of second order serial correlation in differences, AB(2) p-value, of 0.021 shows that there is also second order serial correlation. That is, $\Delta\varepsilon_{i,t}$ correlates with $\Delta\varepsilon_{i,t-2}$, which indicates first-order correlation in levels as these terms show the relationship between $\varepsilon_{i,t-1}$ and $\varepsilon_{i,t-2}$. This makes the first lag inappropriate as an instrument since the first lag is now endogenous.

Table 3 presents the first estimations of system GMM, where PTAs and depth of PTAs is included. The Hansen p-value, which is reported in every column, is used to assess the applied set of instruments. It indicates if the applied instruments are valid. If a model is over-identified, which means that too many instruments are included, the test will show unreliably high p-values. Such high values reveal a very good instrument set by mistake, since the test is weakened by too many instruments. One has to be cautious if the p-value becomes too large, while on the other hand too small values would indicate that instruments are invalid. Roodman (2009) suggests, one should be cautious about values below 0.1 and values well above 0.25. Although this does not constitute a strict threshold, it provides a range of reference.

Table 3 presents the results when the number of PTAs of the previous period (*PTAs (t-1)*) and depth of PTAs signed in the previous period (*Depth (t-1)*) are included separately in model (1) and (2) and together in the third model and, finally, when both variables are interacted in the forth model. In the first regression, lag 4 is used for instrumenting, which leads to a p-value of 0.173 and a suitable set of instruments. If lag 3 is used for this estimation, the Hansen p-value becomes (0.095), which gives rise for invalid instruments. In models (2) to (4) lag three is used for instrumenting. In all regressions of table 3 instruments are uncollapsed.[8] Even when the instruments

[8] In section 3.3.3 the estimates of the main significant variables, for which conclusions are drawn, are presented when also using different lag structures as instruments and when all instruments are collapsed, to test whether the results are robust to different sets of instruments.

Table 3: **Two-step system GMM regression results**

	(1)	(2)	(3)	(4)
INST (t-1)	0.364***	0.420***	0.369***	0.363***
	(0.082)	(0.095)	(0.084)	(0.067)
Ln(Population)	0.138*	0.151*	0.116	0.107
	(0.082)	(0.082)	(0.078)	(0.071)
Ln(GDPpc)	0.583***	0.561***	0.656***	0.614***
	(0.221)	(0.201)	(0.153)	(0.165)
Press Freedom	0.424*	-0.040	0.217	0.108
	(0.245)	(0.200)	(0.245)	(0.229)
Conflicts	-0.735	-0.647	-0.329	-0.232
	(0.596)	(0.564)	(0.515)	(0.447)
Education	-0.014	-0.007	-0.013	-0.007
	(0.009)	(0.008)	(0.008)	(0.007)
PTAs (t-1)	-0.024		-0.023	0.080
	(0.026)		(0.024)	(0.091)
Depth (t-1)		0.151***	0.118**	0.175***
		(0.044)	(0.046)	(0.059)
PTAs(t-1)×Depth(t-1)				-0.032
				(0.028)
Obs. N	493	493	493	493
Countries	87	87	87	87
# Instruments	49	59	69	79
Lags	t-4	t-3	t-3	t-3
AB(2) p-value	0.027	0.010	0.010	0.005
AB(3) p-value	0.990	0.915	0.948	0.882
Hansen p-value	0.173	0.225	0.204	0.216

Notes:
(i) Windmeijer-corrected cluster-robust standard errors in parentheses.
(ii) Significance at the 10, 5, and 1 percent level is denoted by
*, ** and ***, respectively.
(iii) All models include country and year fixed effects

are collapsed, the significance levels of the variables in any regression reported in table 3 remain basically the same. In model (2) Depth remains highly significant, when instruments are collapsed. When *Depth(t-1)* is included together with PTAs in column (3) the significance level of *Depth(t-1)* is reduced and in column (4), where the interaction term is included, *Depth(t-1)* becomes insignificant.[9] The Hansen p-values reported in table 3 are within the range, which is not too close to 0.1 but still not too large, that is well above 0.25. The overall results show that the depth of PTAs matters for institutions. That means higher levels of depth can lead to better institutions, while the number of PTAs itself does not have any effect on institutions. *PTAs(t-1)* is never significant, which indicates that changes in the number of signed trade agreements do not significantly explain changes in the institutional quality. That means, simply signing trade agreements does not help to promote institutions.[10]

The other coefficients have the expected signs except for *Education*, which is negative and significant at the 5 percent level. $PressFreedom$ is positive and significant only at the 10 percent level. All else equal, a one within standard deviation (0.318) in the press freedom would lead to a 0.103 point increase in institutional quality. $Conflicts$, is negative but also only significant at the 10 percent level. A highly significant effect at the one percent level is shown by income, $ln(GDPpc)$, which positively affects the institutions. The effect is more than three times larger compared to $PressFreedom$. A one within standard deviation (0.536) increase in $ln(GDPpc)$ would lead to a 0.332 increase in the institutional quality.

In the following regressions (columns (2) to (4)), when *Depth(t-1)* is included, $PressFreedom$ is no longer significant. Depth might absorb some of the variation of the two variables. When *Depth(t-1)* is included without *PTAs(t-1)* in column (2), it shows a positive effect on institutions, which is highly significant at the one percent level. An increase of a one within standard deviation (1.411) of *Depth(t-1)* would lead to a 0.213 point increase in the level of institutional quality. When the number of trade agreements and depth are both included, *PTAs(t-1)* still does not show any effect on the quality of institutions and, although the significance level

[9] The results where, for each model, instruments are collapsed is reported in the Appendix (table A.4).

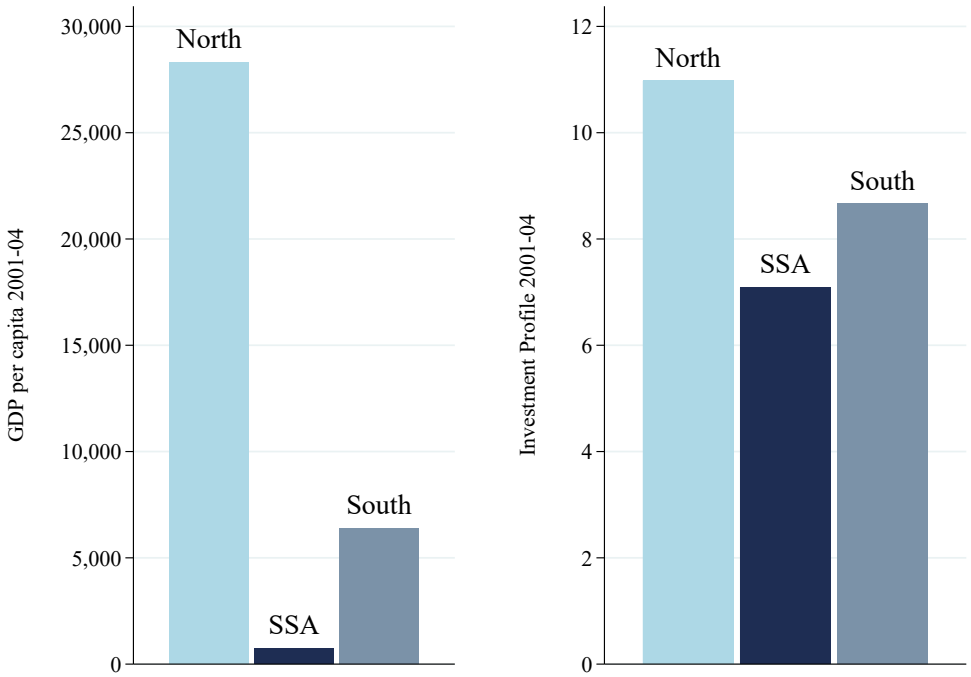
[10] I also checked for different ranges of the number of signed PTAs. That means, one can argue that the first 5 or 10 PTAs may affect institutions but there might be a threshold where an additional PTA might not have any significant effect anymore. In other words, signing an additional 11th or 21st PTAs may not have the same effect as signing the first, 5th or 10th PTA. I test for this by interacting the number of PTAs with dummy variables for having signed PTAs of the following ranges: one PTA, between 2 and 5 PTAs, between 6 and 10 PTAs, between 11 and 20 and between 21 and 30 PTAs. The results do not show any significant effect. So there is no evidence that there is a threshold for the number signed PTAs.

and the effect is reduced, the effect of depth is still positive and significant at the 5 percent level. The reduction in significance levels for depth and also for population, which is not significant anymore, can be a result of the reduction in the degrees of freedom due to additional regressors. In the final column, an interaction term of $PTAs$ and $Depth$ is included additionally to analyze whether changes in $PTAs$ ($Depth$) influence the effect of $Depth$ ($PTAs$) on institutions. The results do not indicate a joint effect of depth and the number of trade agreements. The effect for depth now becomes larger again and highly significant. Except for $ln(GDPpc)$, all other controls remain insignificant.

3.3.1 Check for heterogeneity of countries

So far, the regressions include all developing countries. But looking at different country groups, it can be seen that SSA performs very poorly with respect to several factors of development and institutions compared to other developing countries.

Figure 5: **Investment profile and GDP per capita by region (2001-04)**



Source: Authors' calculations using ICRG and World Bank data.

Figure 5 shows the means of institutional quality and GDP per capita for the years 2001 to 2004 for SSA, compared to all other developing countries (South) without SSA and developed countries (North). It shows the poor performance of SSA with respect to institutions and income. Among the group of all developing countries,

SSA lags behind, which constitutes a persistent situation, which does not change in other periods covered in the sample. Furthermore, the same pattern can be observed for all other dimensions of institutions of the ICRG data, like law and order, corruption or government stability. With respect to GDP per capita, this deficit is even more severe.

Table 4: **Mean for main variables by region**

Variable	SSA	South	North
INST	6.552	7.601	9.340
Education	63.735	88.786	104.095
Conflicts	0.218	0.217	0.035
Press Freedom	0.659	1.097	1.978
GDPpc	991.536	7049.104	32556.290
Depth	1.983	1.965	2.584
PTAs	4.806	2.940	26.725
TIPs	2.554	0.860	3.339

This situation, of low income with a low level of institutions is not specific for Sub-Sahara Africa, but it is the region with the highest density of the poorest economies in the world. Better levels of institutional quality cannot be observed for any developing country exhibiting as low per capita income levels as in SSA. Because they have such poor institutions, it might be more difficult for a country from SSA to implement reforms in general, as well as provisions of very deep trade agreements.

Beside the bad economic situation, those countries have to deal with a lot of other problems like intra- and interstate conflicts, diseases and bad infrastructure. Table 4 reveals that SSA performs poorer compared to other developing countries with respect to factors, which are also included in this analysis. The *Press Freedom* is distinctly lower than in other developing countries. A higher press freedom might serve as a provider of information and as a control on government policies and thus can also promote the successful implementation of policies. Low press freedom instead impedes this positive effect. There is much lower school enrollment, while the presence of conflicts is similarly large as the South without SSA. But in this context, it should be pronounced that this variable does not provide information on the intensity of conflicts.

Overall, this shows the poor performance of SSA and it can be expected that SSA governments do not have the capacity to address all issues at once and even processes

in general might be less efficient. Furthermore, a country needs to have some basic rules implemented before other rules, which are included in a PTA, can be implemented. Moreover SSA countries tend to sign a larger number of PTAs compared to other developing countries. Until the final period of this data set, the mean number of agreements signed by SSA countries lies above the average of other developing countries. Up to period 5 the mean is even more than twice as large. Over the whole period observed, on average a SSA country signs almost 5 trade agreements while other developing countries on average sign three PTAs. So SSA seems to sign relatively more PTAs, whereby this even might increase the burden on the national institutions to implement the agreements properly. Following these considerations, I expect, that the effects of *Depth (t-1)* and *PTAs(t-1)* are different for SSA countries.

Table 5: **Effects of PTAs and Depth for different country groupings**

	(1)
PTAs w/o SSA (t-1)	-0.041
	(0.037)
Depth w/o SSA (t-1)	0.181***
	(0.051)
PTAs SSA (t-1)	0.258**
	(0.111)
Depth SSA (t-1)	-0.310
	(0.295)
Obs. N	595
Countries	90
# Instruments	32
Lags	t-3, t-4
AB(2) p-value	0.001
AB(3) p-value	0.749
Hansen p-value	0.157

Notes:
(i) Windmeijer-corrected cluster-robust standard errors in parentheses.
(ii) All models include country and year fixed effects.
(iii) Instruments are collapsed.
(iv) Significance at the 10, 5, and 1 percent level is denoted by *, ** and ***, respectively.

Table 5 reports the results of a regression, where *PTAs(t-1)* and *Depth(t-1)* are now interacted with dummies, indicating SSA countries *(PTAs SSA (t-1), Depth SSA*

(t-1)) and all other developing countries without SSA *(PTAs w/o SSA (t-1), Depth w/o SSA (t-1))*, respectively. All other control variables (except for *Education*) are included but not shown.[11] Education is not significant in any regression where *Depth (t-1)* and *PTAs (t-1)* are included. To have more observations education is excluded. Due to the additionally included interaction terms, which need to be instrumented, all instruments are collapsed to avoid a too high instruments count, which would lead to too large p-values for the Hansen test statistic.

For developing countries without SSA, it can be seen that the positive effect of depth becomes larger compared to the effect of all developing countries including SSA and it is significant at the one percent level. A one within standard deviation increase in the depth index now leads to an increase in the institution index by 0.254 points. The effect of the number of signed PTAs for this group remains insignificant. For SSA, the effect of depth is not significant, while the effect of the number of signed PTAs now becomes positive and significant at the 5 percent level. This supports the argument that even if those countries sign deep PTAs, they are not able to implement them effectively. On the other hand, for all other developing countries without SSA the positive effect of deep trade agreements becomes even larger compared to regressions when SSA is included. While for SSA simply signing trade agreements has an effect, this supports the argument that simply joining networks with trading partners has a positive effect in these countries. Finally, it should be noted that the different effects, when SSA is excluded, do not only result from an overall lower institutional quality related to SSA but other factors related to SSA must play a role. I also check, whether the effects of *PTAs(t-1)* and *Depth(t-1)* for all developing countries differ with regard to different levels of institutional quality. For this, I perform regressions, where *PTAs(t-1)* and *Depth(t-1)* are interacted with a dummy for having an institutional quality index larger (smaller) than 5, 7 or 8 but this interaction term never becomes significant.

3.3.2 Check for heterogeneity of agreements

At this point all types of PTAs are included, which have the potential to liberalize trade in any form. This includes partial scope agreements as well as full free trade agreements.

Besides the number of PTAs, signatures of (bilateral) investment treaties have increased, especially in the course of the 1990s. The main motive to sign investment treaties is to protect foreign investment. This is why developed countries were the initiators of those agreements. They are typically exporting capital into developing

[11] For detailed results including all control variables see in the Appendix (table A.5).

countries where the legal system usually is less developed and standards are lower compared to the laws, that investors are used to rely on in their domestic country. By the means of an investment treaty, countries can set additional legal standards, which are missing in the host country. This protects the domestic investors, while, for the developing country, this will promote investment inflows, which are beneficial for development. Consequently, investment treaties might play an important role in developing the legal institutions in a developing country and it should be analyzed at this point if treaties, including essential provisions with regard to investment, are the driving factor in promoting institutions or, if the effect does not differ from other PTAs.

To address this question, a new variable, $TIPs(t-1)$, is included. For each country and year, it sums up all signed treaties with investment provisions (TIPs). This means, that these agreements include a chapter with substantive provisions in investment. Now the variable *Depth (t-1)* changes to *Depth w/o IP (t-1)* as this depth index now does not include investment provisions (IPs). *Depth w/o IP (t-1)* now only varies from 0 to 6 instead of a range from 0 to 7. For each of the provisions, which are covered in the six areas intellectual property rights (IPRS), procurement, standards, services or competition a value of one is added. So, if an agreement includes provisions in all areas a depth index of 6 is assigned. *PTAs w/o IP (t-1)* similarly now only includes PTAs without any provisions in investment.

The results are presented in table 6. Now only the third lag is used as an instrument and the instruments are collapsed to avoid too large Hansen p-values. The first column shows that, when TIPs are considered separately, the number of trade agreements signed without investment provisions becomes negative and significant. A one standard deviation increase in *PTAs w/o IP (t-1)* leads to a 1.038 point reduction in the quality of institutions. This value is relatively large compared to the effects from previous regressions. An explanation for this negative effect can be that the effort, dedicated to the signature of PTAs, might reduce the efficiency of government policies with regard to other areas such as investment. Furthermore, the significant, positive effect of depth now disappears. This means that the provisions in areas, like intellectual property rights or standards do not affect institutions, while trade agreements containing investment provisions seem to play a crucial role. The effect is positive and significant at the 5 percent level. Now also $PressFreedom$ has a positive and significant effect. All else equal, an increase in one within standard deviation of the $PressFreedom$ (0.318)results in an increase of 0.516 points in institutions. The effect of *TIPs (t-1)* is only slightly smaller with a 0.458 points increase due to a one within standard deviation increase (1.483), but larger than

Table 6: **Effects for agreements with and without investment provisions (IPs)**

	(1)	(2)
INST (t-1)	-0.440***	0.435***
	(0.117)	(0.113)
Ln(Population)	-0.022	0.034
	(0.139)	(0.146)
Ln(GDPpc)	0.586***	0.748***
	(0.204)	(0.233)
Press Freedom	1.622***	1.448***
	(0.557)	(0.592)
Conflicts	2.575	2.615
	(1.665)	(1.632)
PTAs w/o IP (t-1)	-0.206***	-0.072
	(0.067)	(0.224)
Depth w/o IP (t-1)	0.035	0.048
	(0.127)	(0.134)
PTAs w/o IP × Depth w/o IP (t-1)		-0.043
		(0.072)
TIPs (t-1)	0.309**	0.333***
	(0.124)	(0.115)
Obs. N	595	595
Countries	90	90
# Instruments	22	24
Lags	t-3	t-3
AB(2) p-value	0.082	0.056
AB(3) p-value	0.514	0.557
Hansen p-value	0.136	0.224

Notes:

(i) Windmeijer-corrected cluster-robust standard errors in parentheses.

(ii) All models include country and year fixed effects.

(iii) Instruments are collapsed.

(iv) Significance at the 10, 5, and 1 percent level is denoted by *, ** and ***, respectively.

the effect of *ln(GDPpc)*, where an increase of one within standard deviation (0.536) leads to an increase of 0.314 in the institutional quality. $Conflicts$ and $Population$ do not show a significant effect on institutions.
Column (2) shows that PTAs and depth are independent. The included interaction term of *PTAs w/o IP (t-1)* and *Depth w/o IP (t-1)* is not significant.
The same regression as in column (1) is done with *PTAs w/o IP (t-1), Depth w/o IP (t-1)* and *TIPs (t-1)* being interacted with dummies for SSA and all other developing countries without SSA. The respective results are presented in table 7.

Table 7: **Effects for agreements with and without investment provisions for SSA and without SSA**

	(1)
PTAs w/o IP (t-1)× no SSA	-0.195***
	(0.064)
Depth w/o IP (t-1)× no SSA	0.145
	(0.112)
TIPs (t-1)× no SSA	0.316***
	(0.113)
PTAs w/o IP (t-1)× SSA	0.297
	(0.379)
Depth w/o IP (t-1)× SSA	0.142
	(0.437)
TIPs (t-1)× SSA	-0.131
	(0.374)
Obs. N	595
Countries	90
# Instruments	28
Lags	t-3
AB(2) p-value	0.019
AB(3) p-value	0.702
Hansen p-value	0.402

Notes:
(i) Windmeijer-corrected cluster-robust standard errors in parentheses.
(ii) All models include country and year fixed effects.
(iii) Instruments are collapsed.
(iv) Significance at the 10, 5, and 1 percent level is denoted by
*, ** and ***, respectively.

A problem, which arises here, is that the inclusion of another control variable,

$TIPs(t-1)$, and additional interaction terms lead to an increase in the instrument count. To reduce the number of instruments, only the third lag is used and the instruments are collapsed. Again, all other control variables are included with the exception of *Education*.[12]

For countries from SSA, distinguishing between different types of agreements, leads to insignificant effects. Signing PTAs with or without investment provisions does not show an effect on institutions. The depth of PTAs without investment provisions, as in previous regressions, where investment chapters are included, is not significant. But for all other developing countries without SSA the positive effect of TIPs increases slightly. Now a one standard deviation increase in $TIPs(t-1)$ (1.719) leads to an increase in institutions by 0.543 points. The negative effect of PTAs without investment provisions also becomes larger. A one within standard deviation increase amounts to a 1.144 point reduction in the institutions index. This is an important result, which suggests that the negative effect of signing a large number of PTAs is more severe than the positive effect, which results from the number of TIPs. So the overall effects, when differentiated between the type of trade agreement, again show different results when SSA is excluded.

3.3.3 Check for robustness of instruments

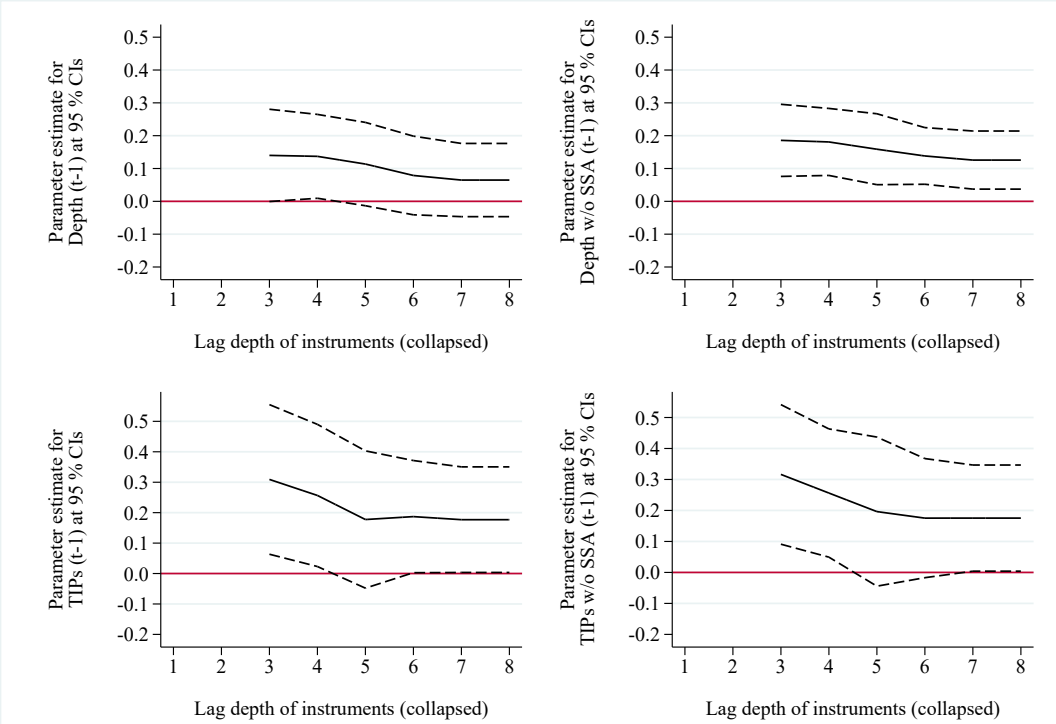
As discussed in chapter 3.2, using system GMM raises the risk of instrument proliferation, which causes the Hansen test to show implausibly high p-values close to one and thus fails to indicate that the model is over-fitted due to a high number of instruments, resulting in too small standard errors. Consequently, using different lag structures can affect the results.

To show how the results develop for *Depth (t-1)* and *TIPs (t-1)* using different numbers of lags as instruments, figure 6 shows the parameter estimates for both variables (graphs on the left) and when interacted with a dummy for the South without SSA *Depth w/o SSA (t-1)* and *TIPs w/o SSA(t-1)*, respectively on the right) using different lag lengths as instruments.

The estimates for *Depth (t-1)* and *Depth w/o SSA (t-1)* are based on the results presented in table 3 column (3) and table 5. The estimates for *TIPs (t-1)* and *TIPs w/o SSA(t-1)* are based on the regressions shown in the first column of table 6 and in table 7, respectively. The solid lines indicate the parameter estimates, while the dashed lines indicate 95 percent confidence intervals (CIs). The estimate for *Depth (t-1)* is obtained from the same model as reported in table 2, column (3). At

[12] A table with the respective results with all included explanatory variables is included in the Appendix (table A.6).

Figure 6: **Robustness of estimates to different lags as instruments**



the very left point of the solid line *Depth (t-1)* is instrumented with the difference lagged by three periods, now with collapsed instruments. Moving from here to the right along the solid line, an additional lagged difference is included in the set of instruments, up to a total of differences, lagged by 8 periods. The estimate for *Depth (t-1)* varies more, relative to uncollapsed instruments. But when instruments are uncollapsed, including more than one lag leads to an increase instruments, leading to a suspiciously large Hansen p-value. The parameter estimates become smaller the more lags are included. It varies from 0.140 when only lag 3 is used, leading to a number of 21 instruments, to 0.065 when lags 3 to 8 are used, which leads to 45 instruments in total. Moreover, the estimates are not significant anymore when lags 6 and longer are included.

The estimate *Depth w/o SSA (t-1)*, shown in table 4, depicts the point on the solid line at lag depth 4 in the top right graph, where differences lagged by period 3 and 4 are included in the instrument set. At lag depth 8 all periods from 3 to 8 are used as instruments. The estimates of *Depth w/o SSA (t-1)* vary only little and remain relatively stable. It ranges from 0.186, when only lag 3 is used, to 0.126, when all lags are used, starting in period 3 and leading to a total number of 36 instruments. The effect remains highly significant at the 1 percent level, independent of the lag length.

The estimates of *TIPs (t-1)* and *TIPs w/o SSA(t-1)*, presented in table 5 colum (1) and in table 6, depict the starting point of the solid line at lag length 3. So the estimation results, which I report above, are already very conservative with respect to the set of instruments since the minimum number of instruments is included. Increasing the lag length from 3 to 5 periods, the estimates for *TIPs (t-1)* and *TIPs w/o SSA(t-1)* reduce by more than 0.1 points, but then remain stable and significant, independent from the lag length used for the instrument set.

4 Conclusion

The phenomenon of the increase in signature rates of trade agreements since the 1990s, has experienced a lot of attention in the academic research. A substantial part of the agreements is between developing and developed countries i.e. between North and South (N-S). Almost simultaneously, the content of trade agreements has changed. PTAs have become deeper. They distinctly exceed regulations from the WTO. PTAs more and more specify political cooperation and include "behind-the-border" rules in different areas such as investment, intellectual property, competition policy or the rule of law. It can be observed that N-S PTAs on average are deeper compared to other types of PTAs, i.e. North-North and South-South PTAs. This development is one result of missing or poor institutions in developing countries trading with developed countries, where firms can do business in a good institutional environment.

This paper provides evidence on whether trade agreements can serve as a driver of institutional quality in developing countries by accounting for the number of signed PTAs as well as the depth of PTAs. I build the anaylsis on the comprehensive DESTA database, including a very broad set of trade agreements and a measure for the content of PTAs. I am specifically looking at the effects on the quality of institutions with regard to investment, since these institutions play an important role for trading firms and firms investing abroad. Rules affecting this type of institutions are expected to be essential in trade agreements. I use a long panel to account for the changes over time and to address endogeneity issues.

The results confirm that deep trade agreements have a positive effect on institutions. But at the same time, the effects differ with regard to different regions. SSA appears to play a specific role. Compared to other developing countries, in SSA the economic and political performance is distinctly poorer. The results show that signing deep PTAs does not have any effect on institutions in SSA. Focusing on developing countries excluding SSA, the positive effect of depth becomes even larger,

compared to the effect when SSA is included, it is highly significant and robust to different lag structures of instruments.

When looking at different types of trade agreements, investment treaties, i.e. those agreements, including substantive investment provisions (TIPs), show to be the important drivers of change in institutional quality. However, signing PTAs in general has no effect. The positive effect of TIPs on institutions even exceeds the overall effect of the deep PTAs. This effect, again, is not present for SSA, where the signing of neither TIPs nor deep PTAs does have an effect on institutional quality. These results reveal positive aspects of the increase in the number of signed N-S trade agreements, especially those including investment provisions. It can be a chance for developing countries to improve domestic institutions, which again has a positive effect on the overall development of the country. However, it should be emphasized, that the analysis focuses on specific institutions related to trade and investment abroad. Besides, this paper has also highlights once more, the specific role of SSA as a region of developing countries, which performs poorer relative to other developing countries with regard to political and economic variables.

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Appendix

Table A.1: Description of variables and sources

Variable	Description	Source
INST	Investment Profile, component of the International Country Risk Guide (ICRG)	ICRG database by PRS Group (2016)
PTAs	Cumulative sum of the number of signed trade agreements for each country	Design of Trade Agreements (DESTA) database by Dür, Baccini and Elsig (2014)
Depth	Average depth of all agreements signed	Design of Trade Agreements (DESTA) database by Dür, Baccini and Elsig (2014)
TIPs	Number of signed Treaties with investment provisions	Authors calculations based on: Design of Trade Agreements (DESTA) database by Dür, Baccini and Elsig (2014)
Education	Gross enrollment ratio, primary and secondary, both sexes (in percent)	The World Bank (2016)
Conflicts	Conflicts of intrastate conflict. Coded 1 in all country-years with at least one active conflict	The UCDP/PRIO Armed Conflict Dataset: Gleditsch et al. (2002); Allansson et al. (2017)
Population	Population (in million)	The World Bank (2016)
Press Freedom	Degree of the freedom of the press, 0 (not free), 1 (partly free), 2 (completely free)	Freedom House (2016)
GDPpc	GDP per capita (current USD)	The World Bank (2016)

Table A.2: List of countries categorized as North or South

Northern countries	Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, sweden, Switzerland, United Kingdom, United States
Southern countries	Albania, Algeria, Angola, Bahamas, Bahrain, Bangladesh, Botswana, Brunei Darussalam, Bulgaria, Burkina Faso, Cameroon, Chile, China, Colombia, Democratic Republic of Congo, Republic of Congo, Costa Rica, Cote d'Ivoire, Croatia, Cyprus, Czech Republic, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Gabon, Gambia, Ghana, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Israel, Jamaica, Jordan, Kenya, Rep. of Korea, Kuwait, Latvia, Lebanon, Liberia, Lithuania, Madagascar, Malawi, Malaysia, Mali, Malta, Mexico, Moldova, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nicaragua, Niger, Nigeria, Oman, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Poland, Qatar, Romania, Russian Federation, Saudi Arabia, Senegal, Serbia, Sierra Leone, Singapore, Slovak Republic, Slovenia, Somalia, South Africa, Sri Lanka, Sudan, Suriname, Syrian Arab Republic, Taiwan, Province of China, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, Vietnam, Zambia, Zimbabwe

Table A.3: Summary statistics

Variable		Obs.	Mean	Std. Dev.	Min	Max
INST	overall	761	7.09	2.27	0.50	12.00
	between			1.56	2.44	10.55
	within			1.66	1.66	10.29
PTAs	overall	792	3.18	3.33	0.00	33.50
	between			2.49	0.03	15.03
	within			2.23	-11.85	21.65
Depth	overall	792	1.80	1.61	0.00	7.00
	between			0.75	0.00	4.61
	within			1.43	-2.81	6.51
TIPs	overall	792	1.30	1.56	0.00	10.75
	between			1.20	0.00	3.84
	within			0.99	-1.94	8.81
Education	overall	652	80.45	20.95	14.60	113.28
	between			19.56	17.20	103.63
	within			9.43	46.28	113.45
Conflicts	overall	768	0.20	0.37	0.00	1.00
	between			0.31	0.00	1.00
	within			0.20	-0.58	1.05
Ln (Population)	overall	783	16.01	1.66	12.33	21.03
	between			1.66	12.55	20.93
	within			0.21	15.13	17.06
Press Freedom	overall	714	0.85	0.73	0.00	2.00
	between			0.65	0.00	2.00
	within			0.35	-0.55	1.85
Ln (GDPpc)	overall	747	7.58	1.47	4.19	11.41
	between			1.36	5.28	10.39
	within			0.54	6.17	9.46

Table A.4: Two-step system GMM regression results (baseline with collapsed instruments)

	(1) inv_prof	(2) inv_prof	(3) inv_prof	(4) inv_prof
INST (t-1)	0.314*	0.383***	0.341***	0.280**
	(0.169)	(0.096)	(0.108)	(0.128)
Ln(Population)	0.206	0.079	-0.033	-0.012
	(0.177)	(0.080)	(0.091)	(0.104)
Ln(GDPpc)	0.716**	0.442**	0.460**	0.381
	(0.318)	(0.200)	(0.232)	(0.268)
Press Freedom	0.245	0.320	0.592	0.955
	(0.873)	(0.410)	(0.490)	(0.659)
Conflicts	-1.104	0.135	0.413	0.955
	(2.226)	(0.886)	(1.017)	(1.182)
Education	-0.017	-0.003	-0.005	-0.008
	(0.012)	(0.009)	(0.012)	(0.013)
PTAs (t-1)	-0.007		-0.028	-0.203
	(0.060)		(0.039)	(0.128)
Depth (t-1)		0.200***	0.140*	0.074
		(0.068)	(0.071)	(0.085)
PTAs(t-1)×depth(t-1)				0.057
				(0.035)
Obs. N	493	493	474	474
Countries	87	87	86	86
# Instruments	19	19	21	23
Lags	t-4	t-3	t-3	t-3
AB(2) p-value	0.098	0.008	0.019	0.096
AB(3) p-value	0.872	0.885	0.596	0.395
Hansen p-value	0.196	0.266	0.026	0.134

Notes:

(i) Windmeijer-corrected cluster-robust standard errors in parentheses.

(ii) All models include country and year fixed effects.

(iii) Instruments are collapsed.

(iv) Significance at the 10, 5, and 1 percent level is denoted by

*, ** and ***, respectively.

Table A.5: Effects for Sub-Sahara Africa (SSA) and all other Southern countries without SSA (w/o SSA)

	(1)
INST (t-1)	0.371***
	(0.084)
ln(Population)	0.096
	(0.119)
ln(GDPpc)	0.667***
	(0.235)
Press Freedom	0.372
	(0.303)
Conflicts	0.106
	(1.005)
PTAs w/o SSA (t-1)	-0.041
	(0.037)
Depth w/o SSA (t-1)	0.181***
	(0.051)
PTA SSA (t-1)	0.258**
	(0.111)
Depth SSA (t-1)	-0.310
	(0.295)
Obs. N	595
Countries	90
# Instruments	32
Lags	t-3, t-4
AB(2) p-value	0.001
AB(3) p-value	0.749
Hansen p-value	0.157

Notes:

(i) Windmeijer-corrected cluster-robust standard errors in parentheses.

(ii) All models include country and year fixed effects.

(iii) Instruments are collapsed.

(iv) Significance at the 10, 5, and 1 percent level is denoted by *, ** and ***, respectively.

Table A.6: Effects for agreements with and without investment provisions without SSA and for SSA

	(1)
INST (t-1)	0.423***
	(0.098)
ln(Population)	-0.038
	(0.133)
ln(GDPpc)	0.578*
	(0.301)
Press Freedom	1.199**
	(0.470)
Conflicts	2.577
	(1.553)
PTAs w/o IP (t-1)×no SSA	-0.195***
	(0.064)
Depth w/o IP (t-1)×no SSA	0.145
	(0.112)
TIPs (t-1)×no SSA	0.316***
	(0.113)
PTAs w/o IP (t-1)×SSA	0.297
	(0.379)
Depths w/o IP (t-1)×SSA	-0.142
	(0.437)
TIPs (t-1)×SSA	-0.131
	(0.374)
Obs. N	595
Countries	90
# Instruments	28
Lags	t-3
AB(2) p-value	0.002
AB(3) p-value	0.667
Hansen p-value	0.189

Notes:

(i) Windmeijer-corrected cluster-robust standard errors in parentheses.

(ii) All models include country and year fixed effects.

(iii) Instruments are collapsed.

(iv) Significance at the 10, 5, and 1 percent level is denoted by *, ** and ***, respectively.

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