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Working Paper Modern Slavery – An Empirical Analysis

Thünen-Series of Applied Economic Theory - Working Paper, No. 167

Provided in Cooperation with: University of Rostock, Institute of Economics

Suggested Citation: Willert, Bianca (2021) : Modern Slavery – An Empirical Analysis, Thünen-Series of Applied Economic Theory - Working Paper, No. 167, Universität Rostock, Institut für Volkswirtschaftslehre, Rostock

This Version is available at: https://hdl.handle.net/10419/245955

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Thünen-Series of Applied Economic Theory Thünen-Reihe Angewandter Volkswirtschaftstheorie

Working Paper No. 167

revised version November 2021

Modern Slavery – An Empirical Analysis

by

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Wirtschafts- und Sozialwissenschaftliche Fakultät Institut für Volkswirtschaftslehre 2021

Modern Slavery – An Empirical Analysis

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Abstract

Contemporarily, modern slavery represents one of the most serious human rights violations. Although most countries officially abolished slavery and ratified the 1926 Slavery Convention of the League of Nations, slavery and slave-like practices still exist in various forms throughout the world. This paper addresses why coercive relationships persist today and investigates how political decision-making, institutional environment and coercive labor practices are interlinked. Moreover, we investigate the interplay between domestic anti-slavery laws and the extent of modern slavery. This paper identifies social and economic determinants of modern slavery using a novel dataset. The panel data contain information on 144 countries and territories from 2002 – 2016 for various types of exploitation of adults and children. We study determinants of modern slavery using cluster analysis and fit a fixed effects model to explain which factors drive exploitation. We find that different types of exploitation are driven by different factors. In addition, we show that slave-sending and slave-receiving countries differ significantly. We study transnational human trafficking and identify which social and economic factors determine this specialization. Moreover, we fit a model using Poisson regression to study why some countries detect victims, originating form more countries, than others do.

Keywords: modern slavery, human trafficking, exploitation, human rights

JEL classification: J47, K42, O15

Acknowledgement: I am indebted to my supervisor, Michael Rauscher, for his valuable advice and his willingness to discuss research strategies and results. I am also grateful to Justin Bucciferro, Zachery Schaller and the participants of the research seminar at the University of Rostock for their helpful comments.

1 Introduction

Human trafficking is an umbrella term for various types of exploitation. It can be defined as "the recruitment, transportation, [...] or receipt of persons, by means of threat or use of force or other forms of coercion" (United Nations 2004, p. 42). In addition, abduction, fraud, deception or the abuse of power to "achieve [...] a person having control over another person, for the purpose of exploitation" might be used (United Nations 2004, p. 42). Modern slavery includes "sexual exploitation, forced labor or services, slavery or practices similar to slavery, servitude or the removal of organs" (United Nations 2004, p. 42). The elements to define who is a slave are threefold: First, it is impossible to walk away from exploitation. Second, remuneration is absent or at most in the form of a subsistence wage. Third, violence or the prospect of violence are involved (Bales 2000).

In 2016, 40.3 million people were victims of modern slavery. Of those, 25 million people were victims of forced labor. Worldwide, about 0.6 percent of all adults were exploited in 2016. About 77 percent of those were exploited in their home country (International Labour Organization and Walk Free Foundation 2017, p.5). The field of modern slavery is still underresearched, although some attempts have been made to investigate this phenomenon.

Scant attention has been paid to modern slavery of adults in the theoretical literature. Acemoglu and Wolitzky (2011) model an environment where forced labor is achieved through punishment. Willert (2021) develops a matching model to examine by which means a slaveholder is able to force individuals to work and how many slaves can be acquired. Rauscher and Willert (2020) develop a model where firms coerce workers into employment if corrupt bureaucrats are accomplices upon accepting bribes. However, many theoretical studies focus on child labor. Basu and Van (1998) focus on parental decisions leading to child labor. Dessy and Pallage (2005) model transnational child trafficking. Rogers and Swinnerton (2008) compare different types of child labor.

Although the literature on modern slavery is still sparse, some empirical work on human trafficking is available. Akee et al. (2010) provide evidence that ethnic fragmentation, conflict, displacement and trafficking are interlinked. Their findings reveal that fragmentation and conflicts predict displacement, which in turn amplifies trafficking. Simmons and Lloyd (2010) investigate transnational crime and human trafficking. Akee et al. (2014) focus on illegal activities and migration. Estimation results from a gravity model show that illegal activities in both domestic and foreign markets reinforce one another and thus the probability of trafficking (Akee et al. 2014). Cho (2013) investigates how human trafficking, women's rights and globalization are interlinked. Her findings reveal increased human trafficking inflows with regard to cultural proximity and increased migration between countries.

A number of studies focus on the determinants of human trafficking. In her analysis, Cho (2015) tests the robustness of various push and pull factors of human trafficking. She concludes that crime, inequality, migration and institutional quality significantly affect exploitation. Hernandez and Rudolph (2015) use a gravity-type model, where country size and vicinity are major explanatory variables to explain human trafficking in Europe. They conclude that victims are more likely to be exploited in countries with weak institutions and open borders, but find no effect of prostitution laws. Frank and Simmons (2013) investigate whether domestic- and international laws affect human trafficking. They show that trafficking is reduced where enforcement is strong and demonstrate the possibility of transnational negative externalities.

In addition to laws, several papers have studied the effect of specific anti-trafficking measures such as prosecutions against traffickers, protection of victims and trafficking-prevention policies. Cho and Vadlamannati (2012) examine several anti-trafficking measures and find that the ratification of anti-trafficking protocols has the strongest effect on crime prevention policies. Cho, Dreher, and Neumayer (2014) develop an index to capture governmental anti-

trafficking measures and find that corruption decreases compliance. Potrafke (2016) examines how countries differ in their anti-trafficking policies by developing a new index.

Particular attention is given to transnational trafficking for the purpose of sexual exploitation. Literature on prostitution laws and international sex slavery includes e.g. Jakobsson and Kotsadam (2013), Aghatise (2004), Cho, Dreher, and Neumayer (2013). Danailova-Trainor and Belser (2006) investigate what determines supply and demand for trans-national sex trafficking. The availability of data on illicit activities is limited and therefore research on slavery is challenging. Nevertheless, some attempts have been made to quantify the extent of human trafficking. Since 2004, the Walk Free Foundation (2018) calculate a 'Slavery Index' where countries are ranked according to the estimated number of victims. The United Nations Office on Drugs and Crime (2020) reports a yearly index on a scale from zero to six to describe the incidence of trafficking. Frank (2013a) has generated categorical variables capturing different types of trafficking and governmental efforts to prevent human trafficking. Belser, Cock, and Mehran (2005) create, in cooperation with the International Labor Organization, a cross-sectional dataset, which contains the number of human trafficking cases for 74 countries.

The main findings of previous studies are that migration flows, quality of institutions, legal framework and crime prevalence influence human trafficking. We build on the existing literature by extending the analysis to 144 countries and territories and using a novel dataset consisting of the estimated number of victims per year per country. This panel dataset was constructed by the author and is based on the Human Trafficking Reports of the U.S. Department of State, 2001–16.

The aim of this paper is to confirm determinants of modern slavery from the previous literature as well as to identify additional factors with the aforementioned new dataset. We want to focus particularly on the role of laws combating modern slavery and their enforcement. To the best of our knowledge, the actual enforcement of existing laws has not been studied previously in the economics literature. In contrast to other studies, we do not focus on the trafficking process itself, but investigate the following issues: Which factors drive the exploitation of adults already present in a certain country? Are forced prostitution and forced labor affected by the same causes? Which factors drive the exploitation of children? What are the differences between adult slave labor and child slavery? How do source and destination countries differ? Why does the number of countries where victims originate from, differ significantly across exploiting countries?

Our results regarding GDP and development are consistent with the literature. We find that wealthy, highly developed or corrupt economies attract exploitation. Our findings support the hypothesis that source and destination countries differ significantly regarding political regimes and socio-economic factors. Both abidance and enforcement of the law lead to increased detection rates of modern slavery. These findings suggest that our results are partly driven by distortions caused by the data generation process. Hence, the main effects in our data are strongly correlated with our control variables. Unfortunately, we could not find a way to examine these effects separately with the data at hand.

In this paper, the terms human trafficking and modern slavery are used synonymously and refer to all phases of the exploitation process. This process starts with the initial recruitment or the abduction of the victim. We refer to forms of exploitation that involve the crossing of international borders as transnational human trafficking.

The remainder of the paper is organized as follows. Section 2 gives an overview of modern slavery. Section 3 introduces pull and push factors of modern slavery. Section 4 covers the Principal Component Analysis. Section 5 describes the data collection process and provides descriptions of the relevant variables. Section 6 outlines the empirical framework and discusses the results. Our conclusions are drawn in the final section followed by potential future research questions.

2 Modern Slavery – An Overview

Modern slavery is a complex and universal issue. In order to understand its complexity, this section gives an overview about the various types of exploitation, the identification of victims, and the conviction of perpetrators.

2.1 Types of Exploitation

There are various forms of exploitation. According to O'Connell Davidson (2010), slavery ranges along a "continuum of exploitation, shading off into servitude and other forms of exploitation, rather than existing as a wholly distinct, isolated phenomenon" (O'Connell Davidson 2010, p. 246). Most forms of adult exploitation involve some form of forced labor¹ or forced prostitution (Koettl 2009). "Labor contracts with substantial advances and high interest rates increase indebtedness towards the employer or landlord, who then assumes control over the labor of the indebted family². Truck systems³, overcharging for food and accommodation, underpayment of labor, and low financial and numerical literacy of victims sustain the dependency of victims on the exploiter" (Koettl 2009, p. 13). According to Steinfeld (2001), slavery is not predominantly exacted through overpowering by physical force, but "by forcing slaves to choose between very unpleasant alternatives, such as death, torture and endless confinement on the one hand, or back-breaking physical labor on the other" (Steinfeld 2001, p. 14). However, the abuse of power, poor housing conditions, and the confiscation of passports or identity documents convert the threat of physical violence into an omnipresent danger (Weissbrodt and Anti-Slavery International 2002). In addition, migrants might perceive the risk of deportation as a substantially powerful threat to endure ill-treatment (International Labour

¹ In this paper forced labor includes forced work in agriculture, mining, brick making, fish processing, gem cutting, carpet weaving, forced work in sweatshops, forced domestic labor and forced begging.

² Genicot (2002) develops a model where individuals choose between bonded labor and casual labor while landlords and credit institutions compete on the credit market. Lilienfeld-Toal and Mookherjee (2010) develop a general equilibrium model of debt bondage.

³ In truck systems, individuals are payed in goods, services or vouchers and not in any currency (Koettl 2009).

Organization 2017). In addition, we examine the exploitation of children. We want to find out if child labor is driven by the same variables as adult forced labor.

The United Nations (2004) define the exploitation of children as "the recruitment, transportation, transfer, harbouring or receipt of a child for the purpose of exploitation" (United Nations 2004, p.43). A considerable amount of literature has focused on the exploitation of children. Several papers focused especially on the influence of parents on child labor (Ranjan 2001; Weinberg 2001; Basu and Chau 2004; Dessy, Mbiekop, and Pallage 2005; Rogers and Swinnerton 2008; Strulik 2008). Dinopoulos and Zhao (2007) identified child labor as substitute to low-skilled labor. Noteworthy studies of child trafficking were carried out by Beber and Blattman (2010) and Kudlac (2015). Basu (1999) examines how international labor laws and child labor are interconnected.

In this paper, we do not consider other forms of exploitation, such as the forced organ removal, forced marriages, forced prison work and forced military. Moreover, we do not examine trafficking channels or by which means victims are enslaved. For research on these topics see i.e. Aronowitz (2001), Simmons and Lloyd (2010) and Willert (2021).

2.2 Identifying Victims

Data on exploitation is scarce. As most illicit behavior happens in legal gray areas, only estimates of the number of victims exist. Moreover, institutions such as the UN or the ILO as well as national legislations provide no standard guidelines on the definition and classification of victims. "The degree of deceit, the type and degree of force, or the type of threats that must be present for a person to qualify as a victim" remain unclear (O'Connell Davidson 2010, p. 252). This discordance may results in the "very small number of people who are actually identified and assisted [...] in any given country" (O'Connell Davidson 2010, p.252).

Most estimations of the number of victims are based on assistance programs in the origin or destination country/region of the victim (U.S. Department of State 2019). In addition to the unavailability of such programs in some areas, not all victims are eligible for assistance. Selection criteria differ across aid agencies and countries. Besides, not all victims are prepared to accept assistance (Brunovskis and Surtees 2007). Other sources for information concerning victims are executive authorities or the judiciary (in the respective origin and destination countries or regions). Again, the identification and granting of a 'victim status' differ among the respective authorities. In addition, some victims are unwilling to testify i.e. due to fear of stigmatization or even retaliation (U.S. Department of State 2019).

The U.S. Department of State (2001-16) estimates the total number of victims based on the victims identified via assistance programs (i.e. shelters, various NGOs), the police or the legal system. Moreover, these estimates include repatriates, who were abused abroad and recognized as victims in their country/region of origin (U.S. Department of State 2001-16).

2.3 Evidence on Convictions

Successful prosecutions of perpetrators are rare, as it is difficult for law enforcement officials to gather sufficient evidence in order to obtain a conviction (Organization for Security and Co-operation in Europe 1999). Investigations and judicial proceedings are often too slow to catch perpetrators. Even more difficulties arise if victims and offenders come from different countries, as effective international cooperation is scarce (Monzini 2004). In addition, convictions do not necessarily occur in the same year as the committed crime (U.S. Department of State 2019).

There are reports of victims who are sentenced and thus among the convictions represented in the dataset. This can happen for example, in countries where prostitution is illegal and victims of forced prostitution can be imprisoned. Unfortunately, cases of convicted victims and perpetrators cannot be distinguished (U.S. Department of State 2019).

3 Pull and Push Factors of Modern Slavery

A vast amount of possible pull and push factors regarding modern slavery are discussed in the existing literature. The terms pull and push factors refer to determinants of demand and supply of victims, respectively. The following subsections give a general overview of the identified variables.

3.1 Institutional Quality and Laws

Jakobsson and Kotsadam (2013) and Aghatise (2004) emphasize the importance of institutional strength and the corresponding legal framework to combat illegal activities. Laws as well as their enforcement are an important indicator of the simplicity of setting up and executing criminal activities. As mentioned by Hernandez and Rudolph (2015), illicit activities flourish where legal institutions are weak and probability of detection and conviction is low. Thus, implementation of anti-slavery laws is as important as their actual enforcement. Moreover, Friedman et al. (2000) show that illegal activities are connected with large informal economies and high corruption.

We expect that better domestic laws against exploitation and their enforcement decreases slavery. Corruption is expected to increase exploitation.

3.2 Market Attractiveness and Migration

Danailova-Trainor and Belser (2006) claim that modern slavery is prevalent in countries with bigger markets i.e. higher GDP per capita and a larger population. A high income-gap between regions encourages migration as migrants expect to be better off after moving. Harris and Todaro (1970) show that an employment opportunity does not necessarily lead to a welfare improvement, but may increase unemployment for migrants as well as locals. Thus, potential jobs for migrants are not necessarily in the legal economy. If migrants attracted by advantageous economic conditions and social welfare are in a precarious situation, they become vulnerable to exploitation (Belser, Cock, and Mehran 2005).

The motives for migration (pull factors) and stimulating emigration (push factors) and thus, their effect on exploitation are quite different. Regarding victim attraction, O'Connell (2011) finds that high-income countries have a significant demand for cheap labor in the informal sector (e.g. domestic work, dirty and dangerous manual work, and prostitution). Due to the lack of alternatives, these jobs are often carried out by illegal immigrants or by coerced labor (Akee et al. 2010). Circumstances impelling emigration are caused by different factors. Hernandez and Rudolph (2015) show that a large population and thus, a substantial share of potential migrants are advantageous for criminal activities. Regarding transnational trafficking, Jakobsson and Kotsadam (2013) argue that legal migration to a country reduces the costs of trafficking for the criminal. In other words, if potential victims are already on-site, transnational trafficking routes are unnecessary.

We expect that population size and GDP per capita increase the number of slaves. In addition, we expect that migration inflows and unemployment increase exploitation, as the pool of potential slaves increases.

3.3 Vulnerability of potential Victims

Di Nicola et al. (2005) and Danailova-Trainor and Belser (2006) discovered that poverty and a high illiteracy rate increase the vulnerability of potential victims. In addition, natural disasters and conflicts were identified as "significant disruptions in socio-economic conditions" (Danailova-Trainor and Belser 2006, p.9). Moreover, differences in socioeconomic development are related to exploitation. In the literature, various measures of inequality are discussed: Clawson, Layne, and Small (2006) use the Gini index as measure for inequality and identify a connection between inequality and human trafficking. Mahmoud and Trebesch (2010) and Bales (2007) study the effect of infant mortality on human trafficking. Laczko and

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Danailova-Trainor (2009) find that low or medium developed countries (measured by their Human Development Indices) are more likely to become source countries for human trafficking. According to Akee et al. (2010) and Cho (2015), refugees are one of the most vulnerable groups regarding exploitation. According to Akee et al. (2010) local and transnational human trafficking cases are regularly identified among the refugee population. Regarding the attractiveness of transnational trafficking and exploitation, high income differences between origin and destination⁴ countries were identified as important factors.

We therefore expect that inequalities and conflicts increase exploitation.

3.4 Crime

Many attempts have been made to find evidence for the link between crime and human trafficking (Akee et al. 2010; Cho, Dreher, and Neumayer 2013; Jakobsson and Kotsadam 2013; Hernandez and Rudolph 2015). There is no consensus on the effect of crime, as the results have been inconclusive. Following the argument of Cho (2015), we will use homicide rates as a proxy for criminal activities. Homicide rates have comparatively high detection rates compared to other crimes and are well documented (Hernandez and Rudolph 2015). Arguably, the homicide rate might be an indicator for the malfunctioning of legal institutions.

Following Hernandez and Rudolph (2015) and Jakobsson and Kotsadam (2013) we assume that criminal activities increase exploitation.

4 Principal Component Analysis and Hypotheses

In order to identify determinants of modern slavery, we focus on country characteristics that have been discussed in other papers (see i.e. Mahmoud and Trebesch (2010); Jakobsson and

⁴ In the literature, destination countries are classified as countries were foreign victims are identified (Danailova-Trainor and Belser 2006).

Kotsadam (2013); Cho (2015); Hernandez and Rudolph (2015)). The original dataset consists of 180 control variables, some of which are highly correlated. As some control variables measure almost the same facts, the set of variables is reduced accordingly.

In order to reduce the data set and identify patterns of association across variables, Principal Component Analysis (PCA) is used. PCA is a method that captures the maximum possible variation from the original variables by summarizing the data in sufficiently few components. In contrast to PCA, Factor Analysis assumes that a few common factors drive the variation in the data. As we do not wish to make such assumptions, PCA is used⁵. Moreover, at this stage, we are more concerned about data reduction than latent variables. Thus, PCA is used to find reasonable variable groupings.

For PCA, the data need to be pooled, as a constant covariance of the included variables over time is assumed. (For the fixed effects models estimated in Section 6 we do not use pooled OLS but dummy variable fixed effects models.) In addition, the values of all input variables were centered and scaled to ensure that the resulting components capture the maximum variance and not the mean of the data. In order to identify patterns of association in the underlying structure of the data, we need to inspect the eigenvectors. Based on the results of the PCA, the number of control variables can be reduced to 20. Following the Kaiser rule⁶, we find that most variables load on four components. We group these factors affecting exploitation in the following categories: institutional quality and laws, (labor) market attractiveness and migration, vulnerability of potential victims, and crime. These groups are in line with the categories established by Cho (2015), Hernandez and Rudolph (2015), and Danailova-Trainor and Belser (2006).

⁵ Both methods yield similar results. For more details about the Principal Component Analysis and the Factor Analysis see the complementary technical discussion in Appendix A4.2.

⁶ The Kaiser rule recommends focusing only on components where eigenvalues exceed one. Thus, the component captures the same variation as the original variable (Kaiser 1960).

5 Empirical Analysis

In our dataset, we have information on 144 countries and territories from 2002 to 2016⁷. The following subsections describe the data collection and provide descriptions of the variables. Descriptive statistics are presented in the Appendix. The empirical strategy will be discussed in Section 6.

5.1 Data Collection

Data on modern slavery is scarce (Frank 2013a; Cho 2015), thus it was challenging to find reliable information on the subject. Since 2001, the US Department of State has been releasing its annual "Trafficking in Persons Report", revealing countries and territories that have a significant number of exploitation cases⁸ (U.S. Department of State 2019). All information is only available in the form of text, but due to its standardized nature, it is possible to transcribe it into an operational dataset.

Hence, we were able to gather information on various forms of exploitation in 144 countries⁹ and territories from 2002 to 2016¹⁰. The countries are ranked according to their effort on combating exploitation. Information on the following types of abuse of adults is available: forced prostitution, forced labor in agriculture and sweatshops, forced domestic work and forced begging. In addition, information on child labor is available. This research focuses on the exploitation of persons in the legal sector. Victims of illegal activities such as drug trafficking or forced conscription into terrorist groups are excluded. For a detailed description of the generation of the data, see Appendix (Section 8).

⁷ Due to the availability of some of the control variables, the number of countries and years varies for the following regressions. Most regressions contain 144 countries and encompass the period from 2002 to 2016.

⁸ The US Department of State only reports countries and territories with at least 100 (assumed) victims per year.

⁹ All countries and territories are listed in the Appendix.

¹⁰ Note that information for every country or territory may not be available for each year. Moreover, not every type of exploitation is recorded in each country or year. In the case of modern slavery, missing information does not prove its inexistence, but rather indicates no detection or reporting of the incidence.

5.2 Variable Description

<u>Victims</u>. The dependent variable of interest, *Slavery*, captures the estimated number of adult victims per year in the reporting/exploiting country¹¹. Adult exploitation includes victims of forced industrial labor, forced domestic labor and forced prostitution. The number of estimated child victims is available as well (per country and year).

<u>Convictions</u>. Number of reported convictions per year in the reporting country. The number of reported convictions per purpose (type of exploitation¹²) is available as well. The US Department of State only reports convictions directly linked to modern slavery. Convictions do not necessarily occur in the same year as the crime. Thus, the number of convictions is assumed to 'lag behind' the number of victims. Reports indicate that sometimes victims are sentenced and thus among the convictions represented in the dataset¹³. Unfortunately, we cannot distinguish between convicted victims and perpetrators. Spikes in reported convictions may be due to successful organized raids or the consequential arrest of a trafficking ring.

<u>Number of slave origins in slave importing countries</u>. Although the number of victims per origin country is unknown, we know the composition of source countries for each exploiting country per year and per purpose. To put it differently, we know the number of (different) origin countries of victims for each exploiting country. We also know whether a reporting country abuses its own citizens or not (in contrast to, for example, only exploiting foreigners). This evidence is available per year and purpose as well.

<u>Number of slave exporting destinations</u>. Unfortunately, we do not know the number of victims a country 'exports' per year. However, we can identify the number of exploiting destinations per source country. In other words, the variable S*lave Exporting Destinations* indicates the

¹¹ The U.S. Department of State defines victimization in accordance with the *Victims of Trafficking and Violence Protection Act of 2000* (U.S. Department of State 2001-16).

¹² We can distinguish between convictions regarding adult forced prostitution, adult forced labor and child labor.

¹³ This can happen for example, in countries where prostitution is illegal and victims of forced prostitution can be imprisoned.

expected number of countries, in which individuals of a certain nationality are enslaved (in a certain year).

<u>Enslavement of the domestic population</u>. As information about the origin countries of the victims is available for each country, we calculate a dummy variable. It indicates whether victims identified in a country are of its own population.

<u>Domestic laws and enforcement</u>. The variable *Domestic Laws* captures to which extent domestic laws combatting modern slavery have been passed in a certain country. It is a categorical variable ranging from 0 to 2, where 2 indicates, "that comprehensive laws prohibiting all forms of trafficking have been passed and come into force" (Frank 2013b, p.14) The parameter is encoded '1' if a country passed only some laws. A value is classified '0' if a country has no laws prohibiting trafficking. The variable *Enforcement* indicates, if the domestic law is actually executed. It is encoded in the same way (0,1,2) as the variable *Domestic Laws* (Frank 2013b).

<u>GDP and population</u>. In order to capture market characteristics, we control for GDP per capita and population. GDP per capita is measured in constant 2010 USD (World Bank 2020a). The World Bank reports population annually as "all residents regardless of legal status or citizenship" (World Bank 2019c, p.1).

<u>Rule of law and homicide rate</u>. Laws are enforced as well as followed to different degrees in different countries. Therefore, we include *Rule of Law* and *Homicide Rate* as control variables. The rule of law measure used in this paper is from the 'World Bank Aggregate Governance Indicators' and is available from 2002 to 2016. It ranges from -2.5 to 2.5 with higher values corresponding to better rule of law outcomes (World Bank 2020f).

The United Nations Office on Drugs and Crime provides data regarding the victims of intentional homicide per 100,000 population (United Nations Office on Drugs and Crime - DATAUNODC 2021).

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<u>Corruption</u>. We use data from the World Bank indicating corruption. The variable *Control of Corruption* "captures [...] the extent to which public power is exercised for private gain, including both petty and grand forms of corruption" (World Bank 2020e, p.1). Data is available from 2002 to 2016 and ranges from -2.5 to 2.5, with higher values corresponding to better outcome, i.e. less corruption.

<u>Source, transit or destination of trafficking</u>. The respective binary variable is encoded as '1' if a country is primarily mentioned as a source, transit or destination country for any type of exploitation and zero otherwise (Frank 2013b). The same information and encoding is available for various types of exploitation (including forced labor and prostitution of adults, debt bondage and child labor) as well.

<u>Immigration</u>. This variable captures the total inflows of foreign population by nationality from the OECD and the International Organization of Migration (2020). Information on immigration is only available for 53 countries, as "the number of countries reporting flow data is limited and the data are often not harmonized" (OECD Data 2020, p.1).

<u>Unemployment</u>. The variable *Unemployment* "refers to the share of the labor force that is without work but available for and seeking employment" (World Bank 2020d, p.1). The total unemployment rate is calculated as percentage of the total labor force. Information on female and male unemployment is available as well from the World Bank (2020d) and defined accordingly.

<u>Infant mortality and adult literacy</u>. In order to account for vulnerability we use *Infant Mortality Rate* and *Adult Literacy Rate*. The infant mortality rate is defined as "the number of infants dying before reaching one year of age, per 1,000 live births in a given year" (World Bank 2019b, p.1). "Adult literacy rate is the percentage of people ages 15 and above who can both read and write with understanding a short simple statement about their everyday life" (World Bank 2020b, p.1). Female and male literacy rate are available as well and defined accordingly. <u>Autocracy</u>. In order to control for the political regime, we use the autocracy index calculated by the Center for Systemic Peace (2020). *Autocracy* is scaled from 0 to 10, with 10 indicating full autocracy.

<u>Human development index (HDI)</u>. In order to capture inequality we use the HDI provided by the United Nations Development Programme (2019). The HDI is scaled on the interval [0, 1], with higher values indicating a higher level of human development. The index is composed of three dimensions: life expectancy at birth, education including years of expected schooling and the gross national income per capita in constant 2011 purchasing power parity terms (United Nations Development Programme 2019).

<u>Refugees</u>. In order to control for vulnerability, we use information on refugee inflows and outflows for each country. Refugees include "people granted refugee-like humanitarian status, and people provided temporary protection" (World Bank 2020c, p.1). Asylum seekers are excluded.

By controlling for legal institutions, attractiveness of economies, vulnerability, and crime, we are confident that we capture the main determinants of modern slavery across countries.

Summary statistics for the variables of interest are presented Table 9 in in the Appendix.

6 Empirical Framework and Results

Based on the theoretical foundations and PCA (see Sections 4 and 9), regression models to determinate modern slavery can be built. Our panel dataset is strongly balanced. We use country fixed effects and thus, can control for factors that differ across countries but are constant over time¹⁴. Due to limited availability of some of the control variables, the following regression is estimated for 144 countries from 2002 to 2016.

$$Slavery_{it} = \beta_0 + \beta_1 DomesticLaws_{it} + \beta_2 \mathbf{X}_{it} + \varepsilon_{it}$$
(1)

Slavery indicates the log of adult slavery victims per capita in country *i* in year *t*. Domestic Laws is a categorical variable ranging von 0 to 2. Higher values indicate more comprehensive domestic laws prohibiting all forms of trafficking. Passing a law does not necessarily mean that it is enforced as well (Frank 2013b). The vector X is composed of control variables including population size, GDP per capita, refugee population, homicide rate, corruption, HDI, infant mortality rate and a measure of the rule of law. The error term ε is normally distributed.

¹⁴ As expected, a Hausman-test recommends the use of a fixed effects model.

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Domestic Laws (some = base)						
No	-1.084*** (0.637)	-1.519** (0.637)	-2.,61*** (0.719)	-1.362** (0.679)	-1.631** (0.706)	-0.696 (0.793)
Comprehensive	0.926*** (0.153)	0.394** (0.170)	0.849*** (0.163)	0.924*** (0.154)	0.051 (0.178)	0.592*** (0.166)
Rule of Law		0.357 (0.439)	0.428 (0.485)	0.968** (0.449)	-0.873 (0.477)	
Homicide Rate (log)						-0.444** (0.216)
Corruption Control		1.039** (0.406)	1.059** (0.445)	1.000** (0.410)	1.297*** (0.433)	1.859*** (0.415)
GDP per Capita (in 1,0000; in 2010 USD)			0.082** (0.038)	0.045 (0.033)		
Population (in Mio.)		-0.002 (0.001)	0.013 (0.007)	0.013 (0.008)		
Refugees Inflows (in Mio)			-0.302 (0.528)		-0.888* (0.498)	-0.321 (0.493)
Unemployment (%)			0.035 (0.033)			
Infant Mortality Rate		-2.650*** (0.393)				
HDI					0.262*** (0.026)	
Conviction Rate (log)						0.320*** (0.039)
Obs.	2,160	2,160	2,160	2,160	2,160	2,160
R ² (overall)	0.556	0.552	0.569	0.552	0.583	0,604
Country FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 1: Estimation results 1

Note: The dependent variable is the log of adult slaves per capita.

* p < 0.1; ** p < 0.05; *** p < 0.01 (standard errors in parentheses)

Contrary to our expectations (see Subsection 3.1), the results in Table 1 reveal a positive connection between comprehensive domestic laws and slavery, whereas the absence of domestic laws has a significant negative effect on slavery. The result is surprising, as the intention of stricter laws is a reduction in slavery. Therefore, we propose the following alternative explanation: *Domestic Laws* does not only measure the effectiveness of the implementation of a law but also the effectiveness of legal institutions. We believe that, based on the available data, the second effect dominates our results. Thus, sound institutions imply

higher numbers of detected victims. However, it is possible that stricter laws lead to increased exploitation. Unfortunately, we cannot detangle and identify the two effects with the available dataset¹⁵.

The effect of corruption on slavery is as expected. Regarding homicide rate, we assumed that criminal activities increase exploitation (see Subsection 3.4). In fact, we observe a negative relationship. The positive sign of corruption control and the negative sign of homicide rate indicate that countries with more resources and sound legal systems might detect more slavery. These results are in line with Clawson, Layne, and Small (2006) and Cho (2015), who argue that higher corruption and homicide rates are an indication for organized crime syndicates, which also operate in human trafficking.

In addition, abidance of the law (captured by *Rule of Law*) and increased conviction rates of slavery-related crimes have a significant positive effect on modern slavery. Thus, *Domestic Laws* captures detection rates whereas the role of law enforcement needs to be tested explicitly. This will be addressed below (see Table 2).

We can confirm our hypothesis that GDP per capita has a significant positive effect on slavery. This is consistent with the findings of Hernandez and Rudolph (2015), Akee et al. (2010) and Belser, Cock, and Mehran (2005). In addition, we find a significant positive effect for the human development index (HDI). Conducting a two-sample t-test shows that on average destination countries have both a significantly higher GDP per capita and HDI than source countries. Thus, as argued in the literature, we identify a higher GDP per capita and HDI in destination countries as dominant 'pull factors¹⁶' of human trafficking (Cho 2013; Cho, Dreher, and Neumayer 2013).

¹⁵ Different identification strategies, robustness checks and varying selection of control variables are presented in the subsequent paragraphs of Section 6.

¹⁶ Lower GDP per capita and HDI in the origin countries of the victims are push factors, respectively.

We find a significant negative effect for infant mortality rate. This result is in line with Mahmoud and Trebesch (2010), who find evidence that regions with higher infant mortality¹⁷ report less trafficking incidents. Thus, we argue that in remote areas with limited access to governmental institutions and shelters for victims, fewer trafficking incidents are reported.

Moreover, higher levels of refugees result in lower slavery. A possible explanation is that refugees will try to flee to 'safe' countries.

In contrast to our expectations, literacy rate has no significant effect on the amount of slaves, thus we do not show the results. Moreover, no significant effects of population size or unemployment¹⁸ were revealed. Executing the regressions with and without the country fixed effects reveals that unemployment is captured by fixed effects¹⁹. In this setting, we find a significant positive relationship between unemployment in the origin country and slavery. This result is consistent with Danailova-Trainor and Belser (2006), who find that unemployment fuels the supply of trafficking victims.

All results are robust when we exclude each country separately for each regression. This indicates that the results are not driven by a single country. If we drop each continent separately, results remain robust as well.

Since the existence of laws does not necessarily reflect their enforcement, we use the following regression to examine the effect of law enforcement:

$$Slavery_{it} = \beta_0 + \beta_1 Law_{it} * Enforcement_{it} + \beta_2 X_{it} + \varepsilon_{it}$$
(2)

¹⁷ Mahmoud and Trebesch (2010) argue that regions with high infant mortality are mostly remote regions with limited access to healthcare.

¹⁸ A two-sided t-test revealed no significant difference in the unemployment rates of source and destination countries.

¹⁹ All other results are robust regarding the inclusion/exclusion of country fixed effects in the respective regressions.

Slavery indicates the log of adult slavery victims per capita in country *i* in year *t*. Domestic Laws indicates if laws to combat exploitation were passed. Enforcement is a categorical variable ranging von 0 to 2 indicating if and to what extend laws are enforced. Higher values indicate stricter enforcement. The vector X is composed of control variables including rule of law, homicide rate, GDP per Capita, population and refugee population. The error term ε is normally distributed.

Variable	Coef.	p-value
Domestic Laws (No = base) Some Comprehensive	0.081 -2.489*	0.930 0.040
Enforcement (No = base) Some Strong	3.167*** 3.097***	$0.000 \\ 0.000$
DomesticLaws#Enforcement (No#No = base) ²⁰ Some#Some Some#Strong	-3.255*** -2.927***	$0.000 \\ 0.001$
Corruption Control	1.684***	0.000
Homicide Rate (log)	-0.285	0.211
Conviction Rate (log)	0.324***	0.000
Rule of Law	0.658	0.221
GDP per Capita (in 1,000)	0.077*	0.031
Population (in Mio)	0.007	0.308
Refugee Inflows (in Mio)	-0.288	0.573
Obs.	2,160	
R-squared (overall)	0.611	
Country FE	Yes	

Table 2: Estimation results 2

Note: The dependent variable is the log of adult slaves per capita

* p<0.1; ** p<0.05; *** p<0.01

The results of Table 2 indicate a significant negative effect of comprehensive domestic laws on slavery, when we control for law enforcement. The active enforcement of laws increases slavery. We believe that law enforcement is another measure of effective institutions and thus

²⁰ Theoretically, more combinations of the various categories of *Domestic Laws* and *Enforcement* are possible. However, some cases are not available, as nonexistent laws cannot be enforced. Other combinations are omitted due to collinearity.

indicates the enhanced detection of victims. We find significant negative interaction effects of law enforcement and domestic laws²¹. The predictive margins are outlined in Table 3, below. As expected, the coefficients of corruption control, conviction rate and GDP per capita are positive and significant. These results are in line with the findings of Di Tommaso et al. (2009) and Akee et al. (2014).

For robustness, we calculated the regressions dropping each country separately, to see if the effects are driven by a single country. The analysis did not reveal any country driving the results unilaterally. All results remain robust if we control for each continent separately.

Slavery (log)	Margin	Std.Err.	Z	
DomesticLaws#Enforcement				
No#No (base)				
Some#No	0.081	0.918	0.09	
Some#Some	-0.058	0.322	-0.18	
Some#Strong	0.170	0.349	0.49	
Comprehensive#No	-2.489**	1.211	-2.06	
Comprehensive#Some	3.167***	0.822	3.85	
Comprehensive#Strong	3.097***	0.842	3.68	

Table 3: Predictive margins

Note: Enforcement without the respective laws is not possible. * p < 0.1; ** p < 0.05; *** p < 0.01

As we include an interaction term between *Domestic Laws* and *Enforcement*, we cannot interpret their effect independently (see Table 2). As the signs of the variables partly differ from the sign of their interaction term, we are interested if the positive or negative effect on slavery prevails. Thus, we examine that the predictive margins²² in Table 3 show a positive effect in

²¹ Using the number of actual convictions as proxy for law enforcement leads to similar results. Hence both law enforcement and the number of slavery-related convictions are an indicator for the soundness of governmental institutions.

 $^{^{22}}$ Predictive margins are called estimated marginal means, as we examine balanced data. This statistic is based on the respective fitted model where the values of covariates are fixed (Williams 2012). Note that the interaction effects cannot be accounted for explicitly, but we can examine the predictions of all possible combinations of *Domestic Laws* and *Enforcement*.

most cases. The sole significant exception is the existence of profound laws with absence of its enforcement. If laws are comprehensive but not enforced, our model predicts a 90% decrease in *Slavery* (compared to no laws and no enforcement). In our view, this result emphasizes that law enforcement measures institutional efficiency. We do not believe that comprehensive laws by themselves are deterring perpetrators from committing crimes. However, if comprehensive laws are implemented, the extent of slavery is smaller with strong enforcement compared to only some enforcement. These results correspond with the findings of Hernandez and Rudolph (2015) and Jakobsson and Kotsadam (2013).

<u>Alternative slavery weighting</u>. For robustness, we also estimated Equation 2 using alternative weights for our dependent variable. To account for the 'overall performance' of institutions, we weigh the number of slaves with the number of convictions²³ and with the homicides per 100,000 population, respectively. The results are still statistically significant and the signs of the estimates are consistent with what we found in Table 2 (not reported). We present the marginal results in Table 4. Again, we observe that comprehensive *Domestic Laws* and strong *Enforcement* yield more slavery (detection) than the reference category (not significant). The significant results for *Slaves per Homicide* suggest that high levels of crime might lead to decreased detection rates induced by e.g. corruption (Clawson, Layne, and Small 2006; Cho 2015). However, if homicide clearance is an indicator for sound institutions, perpetrators might abstain from exploitation if laws are installed and enforced. We believe this argument is plausible and substantiates our claim, as using Slaves per Convictions yields similar results. In other words, laws and their enforcement lead to fewer slaves.

²³ The number of convictions is measured as the total number of convictions in connection with the exploitation of adults.

	Slaves per Convictions (log)		Slaves per Homicide (per 100,000)		
	Margin	Std.Err.	Margin	Std.Err.	
DomesticLaws#Enforcement					
No#No (base)					
Some#No	-0.852	1.961	-0.419	0.735	
Some#Some	-1.329**	0.568	-0.154	0.258	
Some#Strong	-1.582***	0.588	-0.016	0.279	
Comprehensive#No	-4.100	2.313	-2.331**	0.969	
Comprehensive#Some	1.993	1.356	2.335***	0.658	
Comprehensive#Strong	1.938	1.368	2.252***	0.674	

Table 4: Predictive margins for alternative dependent variables

Note: Enforcement without the respective laws is not possible.

*p<0.1; **p<0.05; ***p<0.01



Figure 1: Heat map of exploitation

Source: Own calculations of country specific effects.

We also examined the fixed effects in detail. Figure 1 shows countries exploiting less (gray) or more (black) slaves than the average country (countries without information are left blank). Studying the predicted fixed effects for countries deviating from the average country, we find that countries in North America, Western Europe and Oceania have less slaves than the average country. Countries in Central Asia have, on average, more slaves than the average country²⁴.

The role of migration. According to Mahmoud and Trebesch (2010), modern slavery is associated with migration. Since information on annual immigration is only available for 53 countries²⁵, we examined the effect of immigration separately. However, contrary to our expectations, we were not able to identify a significant effect of immigration. Even if we lag the variable, as it might take some time to deceive potential victims, we do not find significant results. A possible explanation might be that official data on immigration reflects "legal, documented migration, while human trafficking is more closely associated with illegal migration" (Cho 2013, p. 687). As worldwide data on e.g. the total number of migrants is only available in five-year-intervals, the use of this data results in an insufficient number of observations²⁶.

<u>The role of conflicts</u>. As suggested in the literature, we also controlled for external and internal conflicts. In accordance with Rao and Presenti (2012), our results are insignificant and thus not presented in the paper.

<u>Differences in source and destination countries</u>. Addressing the question if source and destination countries differ, we start by estimating Equation (2) for source and destination countries separately. However, these regressions yield the same results as shown in Table 2. Our calculations of the marginal effects indicate that destination countries identify more victims than source countries, but this difference is not statistically significant. Further distinctions regarding source and destination countries are examined in Subsection 6.2.

²⁴ Countries that have significantly more or fewer slaves than the average country are consistent over time.

²⁵ Data on immigration provided by the OECD and IOM reflects manly countries in Europe and the Americas.
²⁶ As this study considers modern slavery from 2002 to 2016, migration data is only available for the years 2005, 2010 and 2015 (International Organization of Migration 2020).

<u>Inclusion of lagged slavery</u>. Random effects and fixed effects panel data models are static and do not allow us to include information from previous periods. Since the assumption that current slavery may be a function of past exploitation, we examine a dynamic panel data model. We follow Wooldridge (2005) and Fenske and Kala (2013) using the Arellano–Bond estimator. Due to insufficient variation over time of several control variables, the respective variables are omitted²⁷. The remaining variables are statistically insignificant, thus we do not show these results.

6.1 Domestic Laws and their Enforcement combatting different Types of Exploitation

In this section, we want to study different types of exploitation. Specifically, we are interested in differences between forced prostitution, forced labor²⁸ and child labor. Thus, we estimate the following regressions:

$$ForcedProstitution_{it} = \beta_0 + \beta_1 Law_{it} * Enforcement_{it} + \beta_2 X_{it} + \varepsilon_{it}, \qquad (2a)$$

$$ForcedLabor_{it} = \beta_0 + \beta_1 Law_{it} * Enforcement_{it} + \beta_2 X_{it} + \varepsilon_{it}, \qquad (2b)$$

$$ChildLabor_{it} = \beta_0 + \beta_1 Law_{it} * Enforcement_{it} + \beta_2 \mathbf{X}_{it} + \varepsilon_{it}.$$
 (2c)

The vector X is composed of control variables including rule of law, homicide rate, GDP per capita, population and refugee population. The error term ε is normally distributed. All regressions include country fixed effects.

²⁷ These variables include *Domestic Laws*, *Enforcement*, *Corruption Control*, *Rule of Law* and *Refugee Inflows*.

²⁸ Forced labor includes forced labor of adults in sweatshops, agriculture, domestic work and forced begging.

Variable	Forced Prostitution	Forced Labor	Child Labor
Domestic Laws (no = base)			
Some	0.696	0.231	-0.433
	(0.846)	(1.008)	(0.924)
Comprehensive	-0.782	-0.078	-0.949
	(1.117)	(1.331)	(1.219)
Enforcement (no = base)			
Some	1.722*	1.383	0.946
	(0.758)	(0.903)	(0.828)
Strong	1.921*	1.246	1.194
	(0.776)	(0.925)	(0.848)
DomesticLaws#Enforcement (no#no = base)			
Some#Some	-1.820*	-1.680	-1.170
	(0.795)	(0.947)	(0.868)
Some#Strong	-1.672*	-1.958*	-1.703
	(0.816)	(0.973)	(0.892)
Corruption Control	0.819	-0.066	-0.908
	(0.428)	(0.510)	(0.467)
Homicide Rate (log)	-0.321	-0.480	-1.063***
	(0.210)	(0.250)	(0.229)
Conviction Rate (log)	0.273***	0.355***	3.284***
	(0.036)	(0.043)	(0.331)
Rule of Law	1.210*	0.592	0.840
	(0.496)	(0.591)	(0.542)
GDP per Capita (in 1,000)	0.023	0.163***	0.159***
	(0.033)	(0.039)	(0.036)
Population (in Mio)	0.006	0.020**	0.025***
	(0.007)	(0.008)	(0.007)
Refugee Inflows (in Mio)	0.233	-0.050	-0.346
	(0.472)	(0.562)	(0.515)
Obs.	1557	1557	1557
R-squared (overall)	0.663	0.530	0.489
Country FE	Yes	Yes	Yes

Table 5: Estimation results 3

Note: The dependent variable is the log of adult forced prostitutes, forced labor and child labor, respectively. The variable conviction rate refers to convictions involving adult victims or child victims as share of total convictions. *p < 0.1; **p < 0.05; ***p < 0.01 (standard errors in parentheses)

Law enforcement and the abidance of the law (rule of law) lead to increased detection of forced prostitution (see Table 5). The interaction terms of domestic laws and enforcement are negative and significant. The predicted margins (not shown) indicate that the positive effect dominates

the negative effect (similar to the discussion of the results in Table 3). The positive effect of the conviction rate is significant for all types of exploitation. Again, we argue that more convictions indicate a sound legal system and thus higher slave detection rates.

A high GDP per capita and a large population increase both forced labor and child labor. As hypothesized, GDP and population are indicators for market attractiveness. This is consistent with the findings of Hernandez and Rudolph (2015), Akee et al. (2010) and Belser, Cock, and Mehran (2005). The effect of the homicide rate is negative and only significant for child labor. This indicates that a higher homicide clearance rate is associated with sound institutions, which in turn leads to fewer child labor victims.

6.2 Destination versus Source Countries

We also test for differences between source and destination countries. As the variables *source* and *destination* are binary, a probit model is necessary. Moreover, panel data require the use of a conditional random effects probit model²⁹ (Wooldridge 2002, p.500-502). We follow the findings of Hahn and Soyer (2005) that logit models should only be preferred if one particular variable determines whether the dependent variable is zero or one. Examining the variables negates the existence of 'extreme independent variables' as no particularly large (or small) value overrides the effects of the other variables. For a formal description see Hahn and Soyer (2005, p.4).

²⁹ All regressions were tested with a panel logit approach and if applicable, with fixed effects. According to the likelihood value, a probit estimation is preferred over logit. In addition, a *Hausman-test* indicates that random effects must be used.

In order to understand which factors determine source or destination countries, we estimate the following models:

$$Pr(source_{it} = 1|X_{it}) = \Phi(\beta X_{it} + v_i)$$
(3)

and

$$Pr(destination_{it} = 1|X_{it}) = \Phi(\beta X_{it} + v_i).$$
(4)

We fit the random effects v_i , which are independent and identically distributed³⁰ for country *i* in year *t*, via maximum likelihood. Φ is the standard normal cumulative distribution function. Standard errors are clustered at the country level, as observations for the same country in different years can be interdependent.

³⁰ Underlying is the variance components model *source*_{it} = 1 $\Leftrightarrow X_{it}\beta + v_i + \epsilon_{it} > 0$, where ϵ_{it} are i.i.d. Gaussian distributed with mean zero and variance $\sigma_{\epsilon}^2 = 1$, independently of v_i (the same holds for *destination*) (Wooldridge 2002, p.500-502).

	source	p-value	destination	p-value
Adult Literacy Rate	0.085*	0.013	-0.049**	0.004
Infant Mortality Rate	0.076*	0.050	-0.009	0.499
Autocracy	-0.172	0.083	-0.018	0.366
Corruption Control	-0.189	0.742	-0.710	0.109
Autocracy#CorruptionControl	-0.099	0.219	-0.002	0.924
GDP per Capita (in 2010 USD, in 1,000)	-0.158***	0.000	0.275***	0.000
Unemployment Rate	0.016	0.605	0.054	0.055
Homicide Rate (log)	-0.188	0.471	0.001	0.995
Domestic Laws (No = base)				
Some	1.621	0.063	0.259	0.854
Comprehensive	3.186*	0.021	-0.263	0.863
Enforcement (No = base)				
Some	-0.969	0.382	0.973	0.122
Strong	-0.575	0.617	0.599	0.367
DomesticLaws#Enforcement (No#No = base)				
Some#Some	0.815	0.466	-1.173	0.084
Some#Strong	0.619	0.598	-0.707	0.328
Rule of Law	0.236	0.766	0.494	0.471
Rule of Law#Homicide Rate (log)	0.064	0.815	0.042	0.872
Constant	-6.088	0.083	3.701**	0.088
rho	0.819		0.718	
Obs.	1,046		1,046	

Table 6: Random effects probit regression for source and destination countries

*p < 0.1; **p < 0.05; ***p < 0.01 (standard errors in parentheses)

We find that a higher literacy rate decreases the probability for a country to be a destination country³¹. Also, a high GDP per capita indicates an attractive slave destination which is in line with the findings of Jakobsson and Kotsadam (2013).

Comprehensive domestic laws increase the probability of being a source country. As the country cares about victim protection within its borders, exploitation takes place somewhere else (transnational trafficking). Surprisingly, a higher adult literacy rate increases the

³¹ Results do not change if we control for female literacy rate only.

probability to be a source country. This result is in line with Di Tommaso et al. (2009), who argue that more educated victims are more likely to seek help and report their perpetrators. Alternatively, literacy rate may act as a measure of income disparities, since we identify a strong (negative and significant) correlation between literacy rate and inequality³². Moreover, an increased infant mortality rate, and thus a lower health status, increases vulnerability (Di Tommaso et al. 2009).

Crime and enforcement of domestic laws have no significant effect on the distinction of source and destination countries, which is in line with the findings of Jakobsson and Kotsadam (2013) and Cho, Dreher, and Neumayer (2013). Furthermore, we controlled for an impact of external and internal conflicts, but did not find significant effects for source countries. This result corresponds to the findings of Rao and Presenti (2012). By contrast, we identify a positive effect for destination countries (not shown). This result can be attributed to 'internal' human trafficking caused by conflicts (Akee et al. 2010).

We do not find a significant effect of the political regime (indicated by the variable *Autocracy*). We expected that restricted movement within autocratic regimes or just low detection rates would lead to a negative relationship. In this context, Cho, Dreher, and Neumayer (2013) find that detection rates of victims are higher in democracies. Although autocratic regimes vary considerably regarding their corruptibility, they face, on average, higher levels of corruption than democracies (Chang and Golden 2010). Thus, we introduce an interaction term between (autocratic) regime and corruption. In contrast to our expectation, that less corrupt autocracies are less likely source countries of modern slavery, the results are insignificant.

If we use the human development index (HDI) instead of *Literacy Rate*, *Infant Mortality Rate* and *GDP per Capita*, all coefficients for *source* are insignificant (not reported). Regarding *destination*, HDI and *Rule of Law* are positive and significant. A possible explanation may be

³² As a measure of inequality we use the Gini index provided by the World Bank (2019a).

the demand for cheap labor in developed countries (see Subsection 3.2). This confirms previous findings in the literature regarding vulnerability (Clawson, Layne, and Small 2006; Di Tommaso et al. 2009). However, the positive effects of HDI and rule of law may indicate efficient victim detection in destination countries.

Values of rho^{33} unequal to zero indicate that the extent of intra-panel correlation cannot be ignored. Moreover, following Butler and Moffitt (1982), we find that the quadrature technique³⁴ of our models is numerically stable.

6.3 Destination versus Source Countries for different Types of Exploitation

In this section, we study if source and destination countries differ if we examine adult forced prostitution, adult forced labor³⁵ and child labor separately. Thus, we estimate Equations (3) and (4) for different types of exploitations. The latent dependent variable of the probit regressions is again *destination* or *source*. The variable is set to one if a country is classified a destination or source country, respectively, and zero otherwise. As described in Subsection 6.2, we fit random effects, which are independent and identically distributed for country *i* in year *t*, via maximum likelihood. Standard errors are clustered at the country level.

³³ The proportion of the total variance contributed by the panel-level variance component is labeled *rho* with $\rho = \frac{\sigma_v^2}{\sigma_v^2 + 1}$, where σ_v is the standard deviation (Wooldridge 2002, p.176, 257-261).

³⁴ We fit the model for different numbers of quadrature points and thus can compare the accuracy of each approximation. Since the coefficients of our model do not change by more than 0.01%, we can interpret them confidently (Butler and Moffitt 1982).

³⁵ Forced labor includes exploitation of adults in sweatshops, agriculture, domestic service and forced begging.

	Forced Pro	stitution	Forced	Labor	Child I	Labor
	source	destination	source	destination	source	destination
Adult Literacy Rate	-0.191	-0.033*	0.008	-0.033*	-0.011	-0.048**
	(0.034)	(0.014)	(0.015)	(0.015)	(0.014)	(0.015)
Infant Mortality Rate	-0 494***	-0.027*	-0.003	-0.027	0.015	-0.042**
Infant Workanty Rate	(0.031)	(0.012)	(0.013)	(0.014)	(0.012)	(0.012)
	(0.031)	(0.012)	(0.015)	(0.011)	(0.012)	(0.011)
Autocracy	-0.304*	-0.048	-0.154*	-0.019	-0.121*	-0.094*
	(0.128)	(0.039)	(0.063)	(0.019)	(0.048)	(0.040)
Corruption Control	-1.997**	-0.694	-0.908*	-0.902*	-0.939**	-1.461***
	(0.617)	(0.392)	(0.384)	(0.412)	(0.372)	(0.375)
Autoorgan#CommunitionControl	0.245*	0.020	0.000*	0.001	0 101**	0.091*
Autocracy#ColluptionCollubi	(0.105)	-0.029	(0.047)	(0.025)	(0.039)	-0.081
	(0.105)	(0.030)	(0.047)	(0.025)	(0.057)	(0.055)
GDP per Capita (in 2010 USD,	-0.218***	0.052*	-0.092**	0.126**	-0.080**	0.055**
in 1,000)	(0.061)	(0.023)	(0.029)	(0.042)	(0.027)	(0.021)
Unemployment Rate	0.024	0.030	-0.026	-0.001	-0.024	0.022
	(0.032)	(0.025)	(0.019)	(0.021)	(0.018)	(0.019)
	1 70 4***	0.001	0.41.2*	0.204	0202	0.029
Homicide Rate (log)	-1.704^{+++}	(0.081)	-0.413^{+}	-0.294	-0.282	-0.028
	(0.400)	(0.142)	(0.170)	(0.170)	(0.140)	(0.137)
Domestic Laws (No = base)						
Some	-1.699***	0.304	1.004	1.374	-0.849	0.318
	(0.399)	(0.874)	(0.707)	(0.983)	(0.752)	(0.643)
Comprehensive		-0.534	1.422	0.765		-0.456
1		(1.042)	(1.041)	(1.134)		(0.930)
E_{n} for some $(N_{n} = h_{n})$						
Some	0.611	1 270*	0.739	1.051	0.508	1 706*
Some	(0.567)	(0.605)	(0.781)	(0.607)	(0.719)	(0.697)
	(0.001)	(0.000)	(01/01)	(0.001)	(01,17)	(0.037)
Strong	-0.492	1.057*	0.064	0.049	-0.351	0.894
	(0.520)	(0.634)	(0./9/)	(0.633)	(0./34)	(0./13)
DomesticLaws#Enforcement						
(No#No = base)						
Some#Some	-0.576	-1.489*	-0.759	-1.551*	-0.733	-2.034**
	(0.372)	(0.642)	(0.810)	(0.643)	(0.755)	(0.724)
Some#Strong		-1.238	-0.510	-1.061	-0.253	-1.484*
		(0.681)	(0.832)	(0.672)	(0.777)	(0.746)
	0 101*	0.700	0.047	4.070		0.000
Rule of Law	2.191*	(0.733)	(0.81)	1.079	0.662	(0.820)
	(1.058)	(0.551)	(0.551)	(0.389)	(0.314)	(0.462)
Rule of Law#Homicide Rate	-0.340	0.032	-0.224	-0.382	-0.079	0.052
(log)	(0.377)	(0.182)	(0.188)	(0.215)	(0.174)	(0.154)
Constant	18.001***	3.699*	0.707	2.687	3.924*	4.425*
Constant	(3.667)	(1.672)	(1.707)	(1.881)	(1.673)	(1.675)
rho	0.993	0.714	0.673	0.764	0.617	0.715
Obs.	1,030	1,046	1,046	1,046	1,039	1,046

Tuble 7. Rundom effects proble regression for source and destinution countries for different types of exploitatio	Table 7	7: Random	effects probit	regression	for source and	destination	countries for	different	types of exploitation
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*p < 0.1; **p < 0.05; ***p < 0.01 (standard errors in parentheses)

A high adult literacy rate decreases the probability to be a destination country for all types of exploitation (see Table 7).

We find a negative relationship between infant mortality rate and the probability to be a source country for forced prostitution. This result corresponds to Mahmoud and Trebesch (2010), who

argue that high infant mortality rate and thus a lack in healthcare leads to fewer reports of human trafficking. Moreover, we find that a high infant mortality rate decreases the probability to be a destination country for forced prostitution and child labor. In this context, Bales (2007) finds that a high infant mortality is a significant push factor regarding human trafficking. Thus, countries with inadequate healthcare (and low wealth in general) are unattractive destinations. In addition, Kudlac (2015) finds that a high infant mortality rate is an indicator for internal human trafficking.

More autocratic countries are less likely to be source countries for exploitation. Surprisingly, the autocracy coefficient for *destination* is only significant for child labor. Less corrupt countries are less likely to be source countries for all types of exploitation. Although autocratic regimes vary considerably regarding their corruptibility, they face higher levels of corruption than democracies (Chang and Golden 2010). Thus, we introduce an interaction term between (autocratic) regime and corruption. We find that less corrupt autocracies are less likely source countries of modern slavery and less likely a destination for child labor.

Wealthy countries are less likely to be source and more likely to be destination countries for all types of exploitation. Countries with high GDP are attractive destination countries for exploitation and arguably superior in the detection of victims (due to better-equipped institutions). This result corresponds with Akee et al. (2010), Cho, Dreher, and Neumayer (2013), Jakobsson and Kotsadam (2013) and Akee et al. (2014).

The coefficients for homicide rate are only significant for source countries of forced prostitution and forced labor. *Domestic Laws* negatively affect the probability to be a source country for forced prostitution. A possible explanation is that laws and their enforcement shift illicit activities to other countries (transnational human trafficking). *Enforcement* is positive and statistically significant for destination countries of forced prostitution and child labor. *Law Enforcement* and *Rule of Law* might be indicators for the efficiency in victim detection. Therefore, we introduce an interaction term between *Rule of Law* and *Homicide Rate*, since functioning institutions are associated with higher crime detection rates. However, the interaction is not significant. Contrary to our expectation, no significant effect of unemployment was identified.

Using HDI instead of literacy rate, infant mortality rate and GDP per Capita does not change any results (not reported). Controlling for political rights or regime transition does not change results. However, contrary to the literature (i.e. Akee et al. 2014) the respective coefficients for political rights and regime transition are insignificant (not reported).

In addition, we tested if cultural proximity³⁶ or geographical distance³⁷ affect the probability to be a source or destination country. Including these variables does not change any results. The coefficients for all cultural proximity or geographical distance measures are insignificant in all settings (not reported).

6.4 Exports and Imports

Although the number of victims for each nationality is unknown, we know the number of countries in which victims from a certain origin were identified. In addition, we also know how many different nationalities were identified in each destination country. We refer to these variables as number of slave exporting destinations (SED) and number of slave origins in slave importing countries (SID), respectively. In this section, we examine how exporting and importing countries differ. As we have count panel data, we assume a Poisson distribution (Greene 2012, p.855-858). Countries with zero exports/imports are not considered, as we do

³⁶ In order to capture cultural proximity, we use the number of countries that have the same official language or countries where at least 9 percent of the population speak the same language from the CPII (Mayer and Zignago 2011).

³⁷ In order to capture geographical distance, we use information from the CPII (Mayer and Zignago 2011). We capture if a country is landlocked, the number of neighboring countries and how many capitals are within the radius of 1000 kilometers of a country's own capital.

not know if the value is truly zero or unobserved. Due to its robust properties, we control for unobserved heterogeneity with a conditional fixed effects Poisson model³⁸.

We estimate the following fixed effects Poisson models:

$$E(SlaveExportingDestinations_{it}|X_{it}, \alpha_i) = \alpha_i exp(\beta X'_{it}),$$
(5)

and

$$E (SlaveImportingCountries_{it}|X_{it}, \alpha_i) = \alpha_i exp(\beta X'_{it}),$$
(6)

where E is the expected number of different countries victims are sent to or received from, respectively. X_{it} is a vector composed of control variables, α_i is the individual specific effect. The conditional mean of the Poisson distribution is $\lambda_{it} = \exp(\beta x'_{it})$. In models with multiplicative effects the conditional likelihood is conditioned on the sum of the outcomes in the panel, thus α_i cancels out in the conditional log likelihood (Cameron and Trivedi 2013, p. 335-357).

³⁸ We do not estimate a random effects model, because random effects may be correlated with regressors, which leads to inconsistent coefficient estimates (Cameron and Trivedi 2013, p.364-365). Moreover, fixed effects models produce smaller log likelihoods and thus a better fit for our models. We also tested for overdispersion (Cameron and Trivedi 2013, p.209-214). As we did not identify overdispersion there is no need to fit a conditional fixed effects overdispersion model in the form of a negative binomial model (Cameron and Trivedi 2013, p.357).

Variable	exports (number	p-value	imports (number of	p-value
	of countries)		countries)	
DomesticLaws (base = Some)	1		1	
No	0.794	0.511	1.204	0.249
Comprehensive	1.309***	0.000	1.101*	0.010
Enforcement (base = Some)	1		1	
No	1.211***	0.001	0.993	0.908
Strong	0.941	0.084	0.951	0.141
DomesticLaws#Enforcement	1		1	
(base = Some#Some)				
Comprehensive#No	0.414**	0.010	1.094	0.669
Comprehensive#Strong	1.142**	0.007	1.119*	0.015
Corruption Control	0.769**	0.010	0.933	0.377
Enslavement of own	1.116*	0.017	1.171***	0.000
Population (SOP) = 1				
SOP#CorruptionControl	0.905	0.107	1.006	0.377
Homicide Rate (log)	1.142**	0.002	1.052	0.255
Rule of Law	1.109	0.416	1.182	0.111
Homicide Rate#Rule of Law	0.894*	0.011	0.946	0.100
Population (in Mio.)	1.007***	0.000	1.003*	0.013
Refugee Inflows (in Mio.)	0.669**	0.001	0.798***	0.000
GDP per Capita (in constant	0.997	0.859	0.998	0.616
2010 USD, in 1000)				
Infant Mortality Rate (log)	0.619***	0.000	0.490***	0.000
Obs.	1,112		1,493	

Table 8: Conditional fixed effects Poisson regression for exports and imports (measured in number of countries)

Note: Coefficients are reported as exponentiated coefficients e^b rather than coefficients b and thus interpreted as incidencerate ratios. (Coefficients with values < 1 (>1) refer to negative (positive) coefficient signs.) *p < 0.1; **p < 0.05; ***p < 0.01

The number of countries where victims are exported to is 1.3 times higher for countries with comprehensive laws and 1.2 times higher with no law enforcement. In the presence of strict laws, slave exports increase with increasing strength of law enforcement (see Table 8). These results indicate that exploitation is relocated to other countries with fewer laws, weaker law enforcement, or both. The rate of import destinations for victims is 1.2 or 1.1 times higher if a country has comprehensive laws and strong law enforcement, respectively. Also, in exporting countries the general abidance of the law (represented by homicide rate, rule of law and their interaction) has a negative effect on the number of exporting destinations.

As expected, individuals of less corrupt states are exported to fewer exploitation destinations. Countries exploiting their residents are exporting to and importing from an increased number of locations. A bigger population increases the number of potential victims and thus the number of trafficking destinations. For importing countries, a bigger population might increase the demand for cheap labor from abroad.

A high infant mortality rate has a negative effect on the number of export and import countries. Regarding the number of export destinations, it is possible that lower health discourages individuals from migrating or decreases the 'attractiveness' for traffickers. Concerning imports, a country with low health standards might be less wealthy and therefore not be an attractive destination country.

We find a negative relationship between *Refugee Inflows*, the number of slave origins and slave destinations, respectively. A possible explanation is that refugees will in general try to flee to 'safe' countries.

7 Discussion and Conclusion

This paper adds to the literature of modern slavery. Using panel data over the 2002-2016 period for 144 countries, we investigated social and economic determinants of modern slavery. We examined the effects on the expected number of victims and studied the differences between source and destination countries. Furthermore, we outlined possible mechanisms influencing how many different nationalities are exploited in a certain country. The evidence from this study suggests that effective policies against modern slavery require sound institutions, implementation of relevant laws and their enforcement. Moreover, the findings of this study support the idea that law abidance in general is an important factor.

In addition to the existing literature, we have confirmed that a high GDP and conviction rate increase slavery. Additional results imply that highly developed or corrupt countries are attractive locations for exploitation. We have demonstrated that political regime, literacy rate, health and conflicts affect source and destination countries differently. Moreover, we find that the number of refugees has a negative effect on exploitation. We believe this result is driven by the desire to take refuge in a safe country. We also examined the areas of migration and unemployment. However, these results were not significant. We investigated how our results vary for different types of exploitation by discussing differences in forced prostitution, adult forced labor and child labor.

We are aware that the relationship of victim identification and quality of institutions is problematic. On the one hand, well-organized institutions per se reduce the number of slaves. On the other hand, efficient institutions detect more victims due to improved tracking and analytical statistics. The victim data we use are collected by the US Department of State. As a result, the observations of the United States indicate that consistent data acquisition leads to increased numbers of detected victims. Unfortunately, it has not been possible to locate suitable identifying strategies to address this potential endogeneity.

Another important limitation lies in the lack of data on exploitation. Consensus on data collection and consistent and well-documented data-gathering methodologies is needed. Identifying victims is important to combat modern slavery as personal information about, i.e., age or gender of the victims would generate further insights. Moreover, differentiation between current and former trafficking victims is impossible. In order to discuss policy measures regarding the prevention of human trafficking, research concerning persons at risk is necessary. The picture is still incomplete, but this study has gone some way towards enhancing our understanding of modern slavery.

Future research is already planned. Our data suggests that in different countries different types of exploitation are predominant. Thus, there is a need to enhance our knowledge on country specific differences that drive exploitation. To further our research, the existing dataset will be expanded to a pairwise dataset in order to capture bilateral 'exploitation relationships'.

8 Appendix – Summary Statistics and List of observed Countries

Table 9: Summary statistics

				IVIAX
Adult Slaves per Capita (log)	-7.197	4.465	-18.123	-1.605
Domestic Laws	1.39	.509	0	2
Law Enforcement	1.184	.626	0	2
Rule of Law	095	.996	-2.606	2.1
Homicide Rate	7.69	11.919	0	105.231
GDP per Capita in 2010 USD (in 1,000)	12.714	18.018	.195	111.968
Population in Mio.	36.196	134.823	.018	1378.665
Immigration in Mio. ³⁹	0.140	0.234	0.001	2.016
Unemployment Rate in %	7.896	6.08	.15	37.25
Refugee Inflows (in Mio.)	105.354	320.221	.005	2869.419
Refugee Outflows (in Mio.)	63.302	292.812	.005	5524.511
Infant Mortality Rate	29.686	26.843	1.7	136.9
HDI	.672	.163	.259	.951
Autocracy Index	-1.301	15.547	-88	10
Destination Dummy	.782	.413	0	1
Transit Dummy	.627	.484	0	1
Source Dummy	.754	.431	0	1
Adult Literacy Rate	82.606	19.616	14.376	99.999
Female Literacy Rate	79.437	22.942	9.399	99.998
Corruption	079	1.004	-1.869	2.47
Convictions for Slavery-related Crimes (log)	1.299	1.808	0	12.612
Slave Imports (# of Countries)	6.394	6.015	1	39
Slave Exports (# of Countries)	8.051	8.75	1	71
Enslavement of own Population	.627	.484	0	1

Table 9 presents the summary statistics for the variables of interest.

Please see Subsection 5.2 for sources.

³⁹ Annual information on immigration is only available for 53 countries (see Subsection 6.1).

Information on modern slavery is available for the following countries and territories:

Afghanistan Albania Algeria Angola Argentina Armenia Australia Austria Azerbaijan Bahamas Bahrain Bangladesh Belarus Belgium Belize Bolivia Bosnia and Herzegovina Botswana Brazil Bulgaria Burkina Faso Burundi Cambodia Cameroon Canada Central African Republic Chile China Colombia Costa Rica Croatia Cuba Cyprus Czech Republic Denmark **Dominican Republic** Ecuador Egypt El Salvador Estonia Ethiopia Fiji Finland France Georgia Germany Ghana Greece

Guatemala Guinea-Bissau Guyana Haiti Honduras Hong Kong Hungary Iceland India Indonesia Iran Iraq Ireland Israel Italy Jamaica Japan Jordan Kazakhstan Kenya Kuwait Kyrgyzstan Latvia Lebanon Lesotho Liberia Lithuania Luxembourg Macedonia Malawi Malaysia Malta Mexico Moldova Mongolia Montenegro Morocco Mozambique Namibia Nepal Netherlands Antilles Netherlands New Zealand Nicaragua Niger Nigeria Norway Oman

Pakistan Panama Papua New Guinea Paraguay Peru Philippines Poland Portugal Qatar Romania Russian Federation Rwanda Saudi Arabia Senegal Serbia Sierra Leone Singapore Slovakia Slovenia South Africa South Korea South Sudan Spain Sri Lanka St, Lucia Sudan Swaziland Sweden Switzerland Taiikistan Tanzania Thailand Trinidad & Tobago Tunisia Turkev Turkmenistan Uganda Ukraine United Arab Emirates United Kingdom United States of America Uruguay Uzbekistan Venezuela Vietnam Yemen Zambia Zimbabwe

9 Appendix – Data Work and Data Selection

In order to measure modern slavery, we code information about the number of adult victims and child victims as well as the corresponding convictions for 144 countries from 2002 to 2016. These data capture various types of exploitation of adults as well as the number of reported victim's nationalities and are based on the Trafficking in Persons Reports (TIP) of the U.S. Department of State (2001-16). In order to complete our dataset we also continue the work of Frank (2013a) using the respective method described in the corresponding Codebook (Frank 2013b).

9.1 Data Work

From various "Trafficking in Persons Reports" of the U.S. Department of State (2001-16) we generate variables capturing modern slavery for each available country from 2001 to 2016:

<u>Number of adult victims</u>. The Trafficking in Persons Reports indicate how many adult victims of modern slavery are 'identified', 'estimated', 'trafficked' or 'exploited' in various types of exploitation. If the purpose of exploitation is explicitly mentioned, we can generate the variables 'forced prostitution', 'forced labor', 'forced domestic work', and 'forced begging', respectively. We also generate the category 'Not Known' if the exact purpose is not mentioned. For each country, we sum up the number of adult victims associated to the same year. At times, some victims are not mentioned in the corresponding report but in a subsequent one. In these cases, we added the victims to the year stated in the report. The reports are organized in 'country narratives' where each country is discussed separately. Sometimes, some victim numbers of a country are not indicated in the corresponding narrative but in that of another country. In these cases, we add the numbers to the country where the victims have been detected. In Subsection 9.2, we show how we generate our variables using an example from the "Trafficking in Persons Report" for Canada in 2005. <u>Number of child victims</u>. This variable captures how many child victims were 'identified', 'estimated', 'trafficked' or 'exploited' in each country per year. Here, we do not distinguish between different forms of exploitation. If victims are not mentioned in the corresponding report but in a subsequent one or are not mentioned in the respective 'country narrative' we proceed as mentioned above (see collecting 'the numbers of adult victims').

<u>Number of convictions regarding adult exploitation</u>. This variable captures the number of actual convictions regarding the exploitation of adults for each country and year. At times, convictions are not mentioned in the corresponding report but in a subsequent one. In these cases, we added the number of convictions to the year stated in the report.

<u>Number of convictions regarding child exploitation</u>. This variable captures the number of actual convictions regarding the exploitation of children for each country and year. At times, convictions are not mentioned in the corresponding report but in a subsequent one. In these cases, we added the number of convictions to the year stated in the report.

<u>Enslavement of a country's citizens</u>. This is a binary variable, which is encoded 'yes' if the report explicitly mentions that victims with a citizenship matching the destination country were detected, 'no' otherwise.

<u>Number of slave origins</u>. The U.S. Department of State (2001-16) explicitly mentions the nationalities of victims (but not their numbers) identified in each country. We count how many different nationalities of victims are identified in each country and year. Thus, the respective count variable is generated.

<u>Number of slave destinations</u>. The U.S. Department of State (2001-16) explicitly mentions the nationalities of victims (but not their numbers) identified in each country. We count the number of countries where victims of a certain nationality are identified and thus create the respective count variable.

Based on the Trafficking in Persons Reports of the U.S. Department of State (2001-16), we complete the existing dataset of Frank (2013b) for the years 2012-2016 regarding the following variables:

<u>Source</u>, <u>destination or transit country</u>. A country is classified as source, destination or transit country if the text mentions one or more of the aforementioned categories as the primary context of exploitation. Moreover, we differentiate between source, destination or transit countries regarding the exploitation of children or adults. Concerning adult slavery, we differentiate between forced labor and forced prostitution.

<u>Domestic laws</u>. This continuous variable has three categories ranging from 0 to 2. Zero indicates the absence of laws combating human trafficking. If some laws outlawing at least some forms of exploitation are present, the variable is encoded 'some' (or '1'). If the laws prohibit all forms of slavery the variable is encoded 'comprehensive' (or '2').

Law enforcement. This continuous variable has three categories ranging from 0 to 2. This variable is encoded zero if a country shows 'no efforts', 'negligible efforts' or the 'government failed to demonstrate any notable law enforcement efforts' according to the U.S. Department of State (2001-16). The variable is encoded 'some' (or '1') if law enforcement is described as 'limited', 'weak', 'some', 'minimal', 'insufficient' or 'poor'. Enforcement efforts are encoded 'strong' (or '2') if the text mentions 'strong', 'significant' or 'substantial' law enforcement efforts.

9.2 Data Generation Example

In order to illustrate the data-generation let us consider the following paragraphs from the 2005

"Trafficking in Persons Report" for Canada:

"Canada is primarily a destination and transit country for women trafficked for the purposes of labor and sexual exploitation. Women and children are trafficked from Central and South America, Eastern Europe, and Asia for sexual exploitation. To a lesser extent, men, women, and children are trafficked for forced labor. There is internal trafficking of Canadians for the sex trade. The majority of foreign victims transiting Canada are bound for the United States. Numbers are hard to gauge, but in February 2004, the Royal Canadian Mounted Police (RCMP) estimated that 800 persons are trafficked through Canada into the United States. Some estimate that this number is much higher.

The Government of Canada fully complies with the minimum standards for the elimination of trafficking. The Government of Canada has comprehensive anti-trafficking legislation and has dedicated resources to combat trafficking in persons. Over the year, Canada increased efforts to prosecute and conviction traffickers" (U.S. Department of State 2005, p.79).

The first paragraph above reveals that Canada is a destination country for forced labor and sexual exploitation of adults. Moreover, it is a destination for child exploitation. In addition, victims are trafficked internally. In 2004, the number of estimated victims is 800, although the type of exploitation is 'Not Known'. The report for Canada also mentions 1,500-2,200 victims in the United States, whose type of exploitation is unknown as well. Thus, an average of 1850 victims is attributed to the United Stated in 2004.

The second paragraph shows that "Canada fully complies with the minimum standards" (U.S. Department of State 2005, p.79). Therefore, the variable *Domestic Laws* is encoded 'strong'. *Enforcement* is encoded 'strong' as well.

9.3 Data Selection

We use a comprehensive dataset that covers demographic, economic and political characteristics of 144 countries from 2002 to 2016. During the data-gathering process, it is not possible to determine which variables will be relevant for the model. In order to extract meaningful variables from the noise in the dataset we apply Principal Component Analysis (PCA).

PCA is a linear transformation of p original variables $x = [x_1, x_2, ..., x_p]$. Thus, the components $z = [z_1, z_2, ..., z_p]$ are a linear combination of the eigenvectors $u = [u_1, u_2, ..., u_p]$ of the original variables⁴⁰. The components are orthogonal and the combination of all z comprehend the same information as the original variables. The first component, z_1 , accounts for the maximum possible variance. Thus, no component can have a higher variability than the first one. The second component, z_2 , accounts for the maximum possible variance which is uncorrelated with the first component⁴¹ (Johnson and Wichern 2002, p.426-427). The subsequent principal components are calculated accordingly. They capture the remaining variation and are uncorrelated with previous components⁴².

We use PCA as a data reduction technique to reduce multivariate data through a series of uncorrelated linear combinations of the original variables that account for the greatest variance of the original data. Thus, we want to identify a number of components n < p, which capture the most variation in the original data. Moreover, we can inspect the eigenvectors from the PCA to identify patterns of association in the underlying structure of the data. Bevor the start of the analysis we have to find out if our data is suitable for PCA. Thus, we compute the *Kaiser*-

⁴⁰ The number of components equals the number of original variables.

⁴¹ Each component z contains more information than the subsequent, where z_p has the smallest variance. The total sum of squares of the loadings is *constrained* to unity.

⁴² If p equals the number of retained components, n, all variation in the data is explained.

Meyer-Olkin measure of sampling adequacy (Kaiser and Rice 1974). The result (not reported) indicates that our variables have enough in common to justify our analysis (Kaiser 1970).

PCA is scale dependent, and thus, the eigenvalues and eigenvectors of a covariance differ from those of a correlation matrix. Since we cannot express all variables in the same units, we have to standardize our data by centering the values of all of the input variables⁴³. Thus we use the correlation matrix to construct our components (Johnson and Wichern 2002, p.433-435). The solution is obtained by performing an eigenvalue decomposition of the correlation matrix, where the eigenvalues represent the variances of the associated components.

Following Kaiser (1960) the first four components explain at least as much variation as the original variables (eigenvalues above 1, see Figure 2).



Figure 2: Screeplot of eigenvalues after PCA (excerpt)

Source: Author's Calculation.

⁴³ The mean of each variable is now equal to zero and the standard deviation equals one. If we do not standardize our data, we face large factor loadings for variables with high variance (Johnson and Wichern 2002, p. 445-447).

Table 10 shows the component loadings, which are equivalent to the correlation between the components and the original variable. We depict only correlations higher than 0.3. Column 6 indicates the percentage of unexplained variation for each variable when we use four components. As discussed in the literature and in Section 3, the four components can be attributed to the categories: institutional quality and laws, market attractiveness and migration, vulnerability of potential victims, and crime.

Variable (excerpt)	Comp1	Comp2	Comp3	Comp4	Unexplained
Convictions				0.675	0.367
Corruption Control	0.328				0.154
Government Effectiveness	0.332				0.096
GDP per Capita					0.187
Regulatory Quality	0.341				0.113
Rule of Law	0.338				0.070
Literacy Rate			0.373		0.282
Gini Index		-0.392	0.400		0.295
Migration		0.482			0.244
Domestic Laws	-0.343				0.498
Victim Punishment		0.397		0.363	0.434
Political Rights	-0.314				0.138
Civil Liberties	-0.333				0.1054
Infant Mortality		-0.301			0.227
Unemployment			0.453		0.487
Homicide Rate		-0.382	0.463		0.284

Table 10: Component loadings (excerpt)

Source: Author's Calculation.

Figure 3 shows the location of the countries in the dataset in the principal component space. Apparently, some countries are outliers for certain components. However, testing the robustness of our regressions by dropping each country separately indicates that no country drives any of the results.

Figure 3: Plot of principal component scores.



Source: Author's Calculation.

9.4 Factor Analysis

In addition to the PCA, we also report our results of the Factor Analysis (FA). Johnson and Wichern (2002) state that FA "can be considered an extension of principal component analysis" (Johnson and Wichern 2002, p. 478). Similar to PCA, FA is a statistical data reduction method which describes linear combinations of the variables containing the most information (Spearman 1904). In contrast to the PCA, "the primary question in factor analysis is whether the data are consistent with a prescribed structure" (Johnson and Wichern 2002, p. 478). Like PCA, FA identifies q common factors that linearly reconstruct p original variables:

$$y_{ij} = l_{i1}F_{1j} + l_{i2}F_{2j} + \dots + l_{iq}F_{2q} + e_{ij},$$

where y_{ij} represents the value of the observation *i* of variable *j*. F_1 , F_2 ,..., F_m are the common factors, while the coefficient l_{kj} represents the loading of variable *j* on factor *k*. In contrast to the common factors, the error term *e* is called the specific factor. In order to determine a solution

the following assumptions are made: First, common factors are uncorrelated with each other. Second, specific factors are uncorrelated with each other. Third, common and specific factors are uncorrelated (Johnson and Wichern 2002, p. 478-484).

Before we execute the FA, we calculate the *Bartlett test of sphericity* in order to find out if our data are suitable for structure detection. As our p-value is smaller than 0.05 (not reported) we find that we can factor our correlation matrix (Bartlett 1937).

If we consider only eigenvalues that exceed one, we identify four factors⁴⁴.



Figure 4: Screeplot of eigenvalues after factor analysis (excerpt)

Table 11 shows the factor loadings with correlations higher than 0.3. The column 'uniqueness' indicates the percentage of variance that is not explained by a factor for a given variable⁴⁵.

Source: Author's calculation.

⁴⁴ The majority of eigenvalues associated with our factors are negative and thus cannot be retained (Rencher and Christensen 2012, p. 450). Thus, as an alternative approach we also computed 'principal-component factors' (Johnson and Wichern 2002, p. 492-495). The obtained results do not change; hence, we do not show them here. ⁴⁵ Variables with lower 'uniqueness' are well explained by the common factors.

Similar to the PCA we obtain factors capturing institutional quality and vulnerability, market attractiveness, crimes and laws.

Variable (excerpt)	Factor1	Factor2	Factor3	Factor4	Uniqueness
Convictions		0.525	0.442	0.367	0.381
Corruption Control	0.903				0.155
Government Effectiveness	0.952				0.073
GDP per Capita	0.879	0.382			0.074
Regulatory Quality	0.873				0.185
Rule of Law	0.973				0.036
Literacy Rate	0.760				0.319
Gini Index	-0.791				0.284
Migration		0.743			0.370
Domestic Laws		-0.427		0.451	0.608
Victim Punishment		0.642	-0.362		0.363
Political Rights	-0.794	0.409			0.172
Civil Liberties	-0.859	0.324			0.108
Infant Mortality	-0.891				0.145
Unemployment	0.560				0.551
Homicide Rate	-0.667		0.443		0.285
Political Regime		0.310		-0.623	0.455
Population		0.758	0.327		0.296

Table 11: Factor loadings (excerpt)

Source: Author's calculations.

Figure 5 shows how the original variables of each country load in the factor space. As mentioned before, outliers do not drive any regression results. However, the two 'clusters' of countries clearly visible in Column 1 can be attributed to source (left cluster) and destination countries (right cluster).

Figure 5: Factor loadings in the factor space



Source: Author's calculation.

9.5 Selection of Control Variables

For our regressions we do not use any components or factors, all regressions include the selected original variables. Since we exclusively consider original variables for our regressions and PCA and FA yield similar results, we can use either method in order to examine patterns in our data (Johnson and Wichern 2002, p. 426, 477-478). To select our control variables, we examine the correlation of variables that load on the same component or factor and are similar in their description. If their correlation is high, we include only the variable with the highest eigenvalue (capturing the most variation) in our regressions⁴⁶.

⁴⁶ For robustness, we interchange our controls accordingly (see Section 6).

10 References

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