

CHALLENGES OF GLOBALIZATION
FOR INTERNATIONAL MOBILITY, SOCIAL SECURITY AND
ENVIRONMENTAL SUSTAINABILITY

Dissertation

zur Erlangung des wirtschafts- und sozialwissenschaftlichen Doktorgrades

“Doctor rerum politicarum“

der Ruprecht-Karls-Universität Heidelberg



vorgelegt von

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Heidelberg, 2015

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TAG DER MÜNDLICHEN PRÜFUNG: 17. August. 2015

To my parents and my grandma

Jede Wissenschaft ist, unter anderem, ein Ordnen, ein Vereinfachen, ein
Verdaulichmachen des Unverständlichen für den Geist.

HERMAN HESSE (1877-1962)

Ihrer wahren Wesensbestimmung nach ist die Wissenschaft das Studium der
Schönheit der Welt.

SIMONE WEIL (1909-1943)

ACKNOWLEDGMENTS

This thesis would not have been possible without the support of many people: mentors, colleges, friends, and family.

I am deeply thankful to Axel Dreher who gave me the chance to do a PhD. Your guidance, understanding, and patience was a great inspiration. Thank you for reading and discussing the projects and for being always honest and fair. Special thanks for the chances to attend so many conferences, workshops and discussions, and for being able to get to know your academic family. It is a pleasure to having been part in discussions as well as in so many nice evenings, boat trips, end of the world hikes, BBQs and canoeing. In this regard, thanks to Richard Jong-a-Pin, Martin Gassebner, Christian Bjørnskov and Pierre-Guillaume Méon.

Next, I would like to thank Friedrich Schneider for supporting me in one of the biggest challenges of this PhD project and for agreeing to be second supervisor. Your advice and positive attitude towards the second chapter of this thesis improved the paper and helped me to believe in my work. I thank Jale Tosun for agreeing to be a committee member of the thesis committee. Moreover, I would like to thank Stephan Klasen for his constant support in the Human Trafficking project and Sabine Jaep for her patience in all the big and small challenges during this project.

I also would like to thank all the people who have accompanied me at the economics departments in Göttingen and Heidelberg for the nice and fascinating time. Without you my doctoral studies would not have been the same; the coffee breaks would not have been so inspiring, the discussions not so technical and the evenings would have been boring.

Managing drama was especially fun with Diego with whom I fought through the first two years. We both had to learn many lessons and succeeded this year when we celebrated our first joint publication. Particular thanks also to Maya. I enjoyed sharing an office with you, cracking Stata code, moving to Heidelberg and mastering the challenges of a PhD student, including teaching Macro. You are always a patient listener and an instructive discussant even now when we are talking for hours on the phone.

I would like to thank Elena for many insightful discussions, nerdy evenings and coffee/telephone breaks. Thanks also to Sarah Necker and Katharina Richert. It has been a pleasure to organize the Beyond Basic Questions workshop 2014 in Heidelberg with you both. I learned a lot and appreciate the motivating team work. Finally, I am grateful for the inspiring and insightful atmosphere in the research team of the chair. Coping with tenacious economics arguments and empirical equations was especially fun with Vera, Sarah L., Marta, Andi Fox, Kai, Valentin, Andi L., Matthias, Karin and Nicolas. Thank you for fruitful discussions, creative coffee breaks, ice cream sessions, Radlers and Neckar walks. I would also like to thank Jan Priebe for giving me the chance to come to Jakarta and work together. Special thanks to Jamie Parsons for proof reading and Franziska Volk for magnificent research assistance. Thanks also to Mrs. Arnold.

I am very happy to have so many friends, be it far or near, who always support me in dark times and laugh with me in bright times. You have helped me stay sane through many difficult times, to overcome setbacks and stay focused; thank you Nora, Sandra, Anna, Eva, Heiko, Britta, Linda, Jan, Caro, Christian, Jan, Lena, and many more. I greatly value your friendship and deeply appreciate your belief in me.

Last but not least, none of this would have been possible without the love and patience of my family. I thank you for your faith in me and allowing me to be as ambitious as I want. Most importantly, I am deeply grateful for Ulf. Without you, I probably would have lost my mind several times. Thank you for your tolerance of my moods, unending encouragement and support.



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LIST OF ABBREVIATIONS

AIC	Akaike's and Schwarz's Information Criteria (statistics)
AME	Average Marginal Effect (statistics)
BIC	Bayesian Information Criterion (statistics)
CD	Coefficient of Determination (statistics)
CEPII	Institute for Research on International Economy (database)
CFI	Comparative Fit Index (statistics)
CH ₄	Methane (gas)
CIA	Central Intelligence Agency, United States of America
CIRI	Cingranelli-Richards Human Rights Dataset (Cingranelli and Richards, 2006)
CO ₂	Carbon dioxide (gas)
DPI	Database of Political Institutions (Beck et al., 2001)
CTS	United Nations Surveys on Crime Trends and the Operations of Criminal Justice Systems
DELFL	Distance-adjusted Ethno-Linguistic Fractionalization index (Kollo, 2012)
EC	European Council
ECA	Europe and Central Asia (World Bank region)
EF _{pc}	Ecological Footprint of consumption per capita
EF _{production}	Ecological Footprint of production
EF _{imports}	Ecological Footprint of imports
EF _{exports}	Ecological Footprint of exports
ELF	Ethnic Fractionalization Index (Alesina et al., 2003)
EU	European Union
EUROSTAT	European Union Statistical Office
FDI	Foreign Direct Investment
FIZ	Advocacy and Support for Migrant Women and Victims of Trafficking (Fachstelle Frauenhandel und Frauenmigration)
GDP	Gross Domestic Product

ABBREVIATIONS

GFN	Global Footprint Network
gha	Global hectares (scale unit of the EFs)
GHG	Greenhouse Gas
GNI	Gross National Income
HT	Human Trafficking
ICRG	International Country Risk Guide (The Policy Risk Service Group)
ILO	International Labor Organization, Geneva, Switzerland
IMF	International Monetary Fund, Washington, United States of America
IOM	International Organization for Migration; Geneva, Switzerland
IRCP	Institute for International Research on Criminal Policy, Belgium
ISSA	International Social Security Association (international organization), Geneva, Switzerland
KOF	KOF Swiss Economic Institute, ETH Zürich, Switzerland
LAC	Latin America and Caribbean (World Bank region)
MENA	Middle East and North Africa (World Bank region)
MGI	Maastricht Globalization Index
MI	Multiple Imputation (statistics)
MIMIC	Multiple Indicators Multiple Causes (statistics)
NATLEX	Database of National Labour, Social Security and related Human Rights Legislations (International Labor Organisation)
NFA	National Footprint Account(s)
NGO	Non-Governmental Organization
N ₂ O	Nitro oxide (gas)
ODA	Official Development Assistance (development assistance committee)
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares (statistics)
PCA	Principal Component Analysis (statistics)
PPP	Purchasing Power Parity
PWT 8.1	Penn World Tables version 8.1
RMSEA	Root Mean Square Error of Approximation (statistics)

ABBREVIATIONS

SEM	Structural Equation Model (statistics)
SOCA	Serious Organized Crime Agency, United Kingdom
SSA	Social Security Association, United States of America
SSPTW	Social Security Programs Throughout the World (publication)
TIP	Trafficking in Persons
TLI	Tucker-Lewis Index (statistics)
TVPA	Trafficking and Violence Protection Act, United States Department of State
UK	United Kingdom
UKHTC	United Kingdom Human Trafficking Centre
UN	United Nations
UN.GIFT	United Nations Global Initiative to Fight Human Trafficking
UNCTAD	United Nations Conference on Trade and Development
UN-CTS	United Nations Surveys on Crime Trends and the Operations of Criminal Justice System
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNDP	United Nations Development Program
UNHCR	United Nations High Commissioner for Refugees / UN Refugee Agency
UNODC	United Nations Office on Drugs and Crime
U.S./U.S.A.	United States of America
WDI	World Development Indicators (World Bank data base)
WTO	World Trade Organization



Challenges of Globalization for International Mobility, Social Security and Environmental Sustainability

An Empirical Analysis

PREFACE

Globalization is the tighter integration of the world's economies and societies through trade, capital and migration flows, and diffusion of ideas. Advances in these areas pose a multitude of challenges on individuals, the nation states, as well as the international community.

The motivation to address challenges of globalization for international mobility, social welfare and environmental sustainability from an economic perspective arises from the wish to structure and understand these complex, yet poorly studied phenomena. For that reason each chapter establishes clear hypotheses which are based on economic models explaining the incentive structure of agents or the political economy of institutions. Each empirical analysis uses existing macroeconomic observational evidence to test the predictions and establish meaningful implications for the relevant actors. Taking the multitude of challenges posed by globalization into account, this dissertation contributes to the understanding of three challenges contemporary global politics is facing.

Globalization and International Mobility

International mobility is affected in different ways by globalization: first, new communication technologies and their accessibility reduce the obstacles of geographical distances and increase the availability and diffusion of information in ever larger quantities in less time. Besides the implications for the global economy and political processes, individuals are affected through enhanced mobility as well as professional opportunities. Increasing internationalization of markets and enterprises, and the specialization of production and labor, lead to a tremendous flow of individuals beyond national boundaries. People face the challenge of increased competition not only with

individuals from the same communities, but also with workers from other countries and cultural contexts, who attended different educational systems and grew up in diverse backgrounds.

The opportunities provided by internationalization go hand in hand with dangers of victimization in informal activities. New forms of slavery emerge where people freely emigrate but get enslaved upon arrival in their destination country making human trafficking the third largest criminal activity worldwide (U.S. Department of State, 2004; ILO, 2005; Interpol, 2009). Governments are confronted with attacks against their sovereignty by these growing illicit markets, rendering the assessment of legal issues more complex and demanding in terms of flexibility, states often fail to muster. In this regard, Naím (2003) highlights the illegal trade in people as one of *The Five Wars of Globalization*¹ governments face due to the emergence of globalized criminal networks. The International Labor Organization (ILO, 2005) estimates that at least 2.4 million adults and children are victims of forced labor and sexual servitude as a result of trafficking in persons (TIP). Revenues from this form of exploitation are calculated to be at least US \$30 billion annually.

The research community has increasingly turned its attention to human trafficking as a challenge of globalization in recent years. Therefore, it is of great importance to know what drives human trafficking flows (Chapter I) and to quantify the prevalence of this illicit activity (Chapter II). Both aspects advance the existing literature and contribute to an understanding of the trafficking process which may help to strengthen the toolbox in the fight against the exploitation of individuals.

¹ The other four wars are the illicit trade of drugs, arms, intellectual property and money (Naím, 2003).

Globalization and Social Security

The challenge of globalization for social security is addressed in Chapter III. Technological advances and social change (e.g., different requirements in education, skills and on the labor market as well as in health care provision) lead, on the one hand, to declines in fertility rates and to improvements in life expectancy. On the other hand, these processes lead to growth of the world's population for decades to come, rising from its current 7.2 billion to somewhere between 8 and 10 billion by 2050 (United Nations, 2014).²

These projected trends have several implications that are visible already today: first, the proportion of the population above the age of 65 rises throughout the world ('greying of society'). Consequently the viability of national social security systems is endangered by increasing old-age dependency ratios.³ Second, coverage rates of earnings-related pensions are not high enough to prevent old-age poverty, burdening scarce government resources even more. Both challenges are on the international agenda already for the past three decades and have led to changes in policy approaches of national governments (Holzmann, 2005).

In an article entitled "Age invaders", published in April 2014, *The Economist* addresses the ageing of societies and points out that increased dependency ratios already affect labor markets, productivity levels, savings, and inequality. The United Nations World Population Prospects (United Nations, 2014) show that the number of people older than 65 will rise to 1.1 billion, amounting to a share of 13 percent of the general population, by 2035. This trend is projected to increase the dependency ratio especially in developed, but also in developing countries. Figure 1 visualizes these different trends and projections. Japan and Germany are predicted to have dependency ratios larger than 60 percent with the average reaching almost 50 percent in 2035 in all developed countries.

² The major share of population growth will take place in the least developing countries where fertility rates resume high and mortality declines. Nevertheless, population aging occurs in both developed and developing countries (United Nations, 2014).

³ Dependency ratio is the share of old people to those of working age between 25 and 64.

Figure 1: Dependency ratios world wide



Notes: Data from the United Nations Population Division (2014), figure taken from The Economist “Age invasion” (April, 2014). Old-age dependency is the share of the population aged 65 and older per 100 people aged 25-64.
*Forecast for 2035.

For China, a doubling of the share is forecasted. In the developing countries in general, the dependency ratio is expected to grow to more than 20 percent. Together with low coverage rates in contribution-based pensions these trends have lead many countries to introduce reforms in their pension systems. The aim is to reach the broader population and guarantee the sustainability of pension systems. In other words, pension reforms focus increasingly on basic protection for the vulnerable elderly and at the same time consider the capacity of the funded schemes (Holzmann, 2012). In Chapter III of the present work, a systematic analysis of the provision of social pension finds first evidence for both country and institutional characteristics that support its beneficial implementation.

Globalization and Environmental Sustainability

The relation between globalization and environmental sustainability is another global issue widely discussed in civil society, politics and scientific research. In the process of globalization human demands on the environment have increased manifold, exploiting resources and creating ecological pressures (Crutzen, 2006). Land use changes, resource extraction and depletion (e.g., deforestation and overfishing), emissions of waste and pollution, and the modification and movement of organisms are just a few to name (UNEP, 2012). The resulting environmental impacts are for instance climate change, ozone depletion, land degradation, loss of biodiversity and pollution, among many others (IPCC, 2014; MEA, 2005; UNEP, 2012). Together they make environmental sustainability a global concern since ecological processes seldom respect national boundaries.

Effects are felt worldwide, but the poor and vulnerable in developing countries are particularly affected through famine, water shortages, and competition over resources (IPCC, 2014). The future trajectory is rather an acceleration of this trend than a slowdown based on ongoing population growth and intensified need for access to food, water and energy (Steffen et al., 2011). Reducing the downsides of global change in terms of environmental stressors is thus a great challenge.

The evidence on global environmental change strongly suggests that society is currently still not able to effectively reduce environmental exploitation. The shifting of the consequences of ecological pressures in time and space make its assessment even more difficult (Steffen et al., 2015a). A better empirical understanding of the underlying drivers and causes of human demands on ecosystems, with a special focus on the role of globalization is thus a pre-requisite for effectively addressing these challenges. The complexity of the role of globalization and its impacts on environmental human demand and environmental sustainability are evaluated in Chapter IV of this thesis.



OVERVIEW

Chapter I

In Chapter I (joint work with Diego Hernandez) the determinants of observed human trafficking flows to Western European countries are investigated. New victim statistics are collected from national police forces, service organizations and international agencies that are in direct contact with trafficked individuals. According to Danailova and Belser (2006) their credibility is high since all of these organizations are in direct contact with affected individuals. A large and detailed dyadic database including host country and source country characteristic is constructed based on the obtained numbers. Thereby the drivers of supply and demand of this illicit market formation are empirically analyzed. The gravity-type panel setting even allows controlling for data reporting quality by the adoption of county fixed-effects. In a separate specification the influence of the institutional set-up is explicitly addressed. The analysis contributes new insights on how victim flows are influenced, by a) the institutional set-up of destination countries, and b) the role of policies towards immigrants.

The following set of Hypotheses is tested:

Hypothesis 1

- a) *More intense flows of human trafficking victims are observed between country pairs that have larger income differentials.*
- b) *More intense flows of human trafficking victims are observed between country pairs that have larger populations.*
- c) *Flows between countries are larger if the countries are geographically closer to each other.*
- d) *Well-established routes for migrants and refugees encourage human trafficking and increase the number of victims.*

Hypothesis 2

- a) *Legal enforceability in host countries is a positive determinant of trafficking in persons (TIP) flows.*
- b) *Border controls, such as visa requirements and recognition of asylum seekers determine TIP flows between countries.*
- c) *Legislation on prostitution determines TIP flows between countries.*
- d) *Social trust is expected to reduce TIP flows in both host and source countries.*

Hypothesis 3 Trafficking flows are more common between country pairs with higher levels of criminal activity.

Hypothesis 4 There is an inverted U-shaped relationship between women's rights and human trafficking.

Four major factors are identified in shaping victim flows to Western Europe. First, income differentials in favor of the destination country as well as larger shares of immigrants and of refugees increase trafficking flows to these countries. This suggests that higher migration flows to Western Europe result in an increased pool of potential victims. This correlation is associated with decreasing recruitment costs and increasing prospected profits by criminal networks.

Second, victim flows are also more numerous between large, geographically adjacent countries, indicating that reduced transportation costs also increase recruitment and exploitation profits. Third, more effective legal institutions with a higher assertive capacity reduce exploitation in destination countries, but do not have an effect on the recruitment operations in countries of origin. Additionally, human trafficking flows are increasing when border controls are relaxed, and short-term visa requirements are less strict. This suggests that exploitation opportunities are foremost existent when people are allowed to move unrestricted. There is no systematic relation if migrants are allowed to stay longer and take up work in the destination countries. In other words, if they are allowed to take up jobs the incentives and opportunities for exploitation seem to vanish. Interestingly, we find that the legal setting of the prostitution market does not affect the size of victim movements, neither in the originating countries nor in the host countries.

Forth, social attitudes shape the intensity of human trafficking flows. The perception of general trustworthiness in the population in Europe significantly decreases victim numbers. Social trust seems to reduce exploitation opportunities in destination countries, presumably, because more trusting relationships are associated with a sound institutional environment, hindering traffickers' efforts to find loopholes for exploitative placements.

The results of Chapter I suggest that stricter and more assertive legal rules of prosecution and convictions of offenders are effective tools in order to reduce the number of human trafficking victims.

Chapter II

In this Chapter, a quantification of the intensity of the multi-dimensional process of human trafficking is provided, based on the Multiple Indicators Multiple Causes (MIMIC) approach. An investigation of the economics of human trafficking is generally confronted with the hidden nature of participating actors in this underground activity (Tyldum and Brunovskis, 2005). This makes a direct assessment difficult for policy makers and legal activists alike. To render human trafficking visible, the application of the MIMIC makes use of the observed causes and consequences of human trafficking.

Observed human trafficking relies on the identification of victims and on the prosecution of traffickers, but may only tackle the tip of the iceberg. The quantification suggested in this analysis relies on covariance information of observed causes and on observed indicators to measure the prevalence of human trafficking in destination countries. This approach to assess unobservable phenomena has been used in economics to measure the size of the shadow economy (e.g., Buehn and Schneider, 2012) or corruption (Dreher et al., 2007) among others.

Here, the application of the structural equation approach contributes to the literature in two ways: first, it allows a detailed analysis of the mechanism behind the criminal processes of human trafficking and of the process of the exploitation of vulnerable individuals. Second, the approach allows a relative country ranking according to the intensity of the phenomenon.

The following eight Hypotheses are brought to the data:

- Hypothesis 1* A large extent of human trafficking in a country leads to a high number of identified victims, *ceteris paribus*.
- Hypothesis 2* The larger the scale of HT in a country the more intense the fight against this crime, *ceteris paribus*.
- Hypothesis 3* The more HT takes place in a country the higher the crime rate, *ceteris paribus*.
- Hypothesis 4* The richer the country, the larger is the extent of HT, *ceteris paribus*.
- Hypothesis 5* The larger the demand for low-skilled services where exploitation takes place, the higher the prevalence of HT in the country, *ceteris paribus*.

Hypothesis 6 International investment connectedness increases HT presence in the country, ceteris paribus.

Hypothesis 7 HT is increased by factors that force migration and attract people to a specific (rich) country, ceteris paribus.

Hypothesis 8 Other crime activities also have causal effects on HT, ceteris paribus.

The estimation results support the main hypotheses on the drivers and indicators of human trafficking. After scrutinizing the validity of the approach and applying a multitude of sensitivity tests regarding outliers and model fit, the estimates are used to generate an intensity index of human trafficking in destination countries. Since the measure is calculated on a yearly basis over the 2001-2010 period, this index offers the opportunity to analyze the development of human trafficking inflows in the last decade. Compared to other measures of legal aspects and to visibility of human trafficking, the index shows the expected properties. It is positively correlated with the tier rank of the US Department of State (Trafficking in Persons Report, 2001-2012) and reported human trafficking incidences (UNODC, 2006). Additionally, in a simple regression framework the intensity of human trafficking, measured by the index, is shown to reduce after the ratification of the anti-trafficking protocol of the UN (United Nations, 2000).

The applications and the relevance of the intensity index make the MIMIC approach a suitable instrument to quantify human trafficking intensity in destination countries. It will allow for future in depth analysis of related aspects. Approximating human trafficking by this measure provides policy makers with an effective tool to assess international human trafficking at both ends of the trafficking process in terms of victim protection and prosecution of traffickers alike.

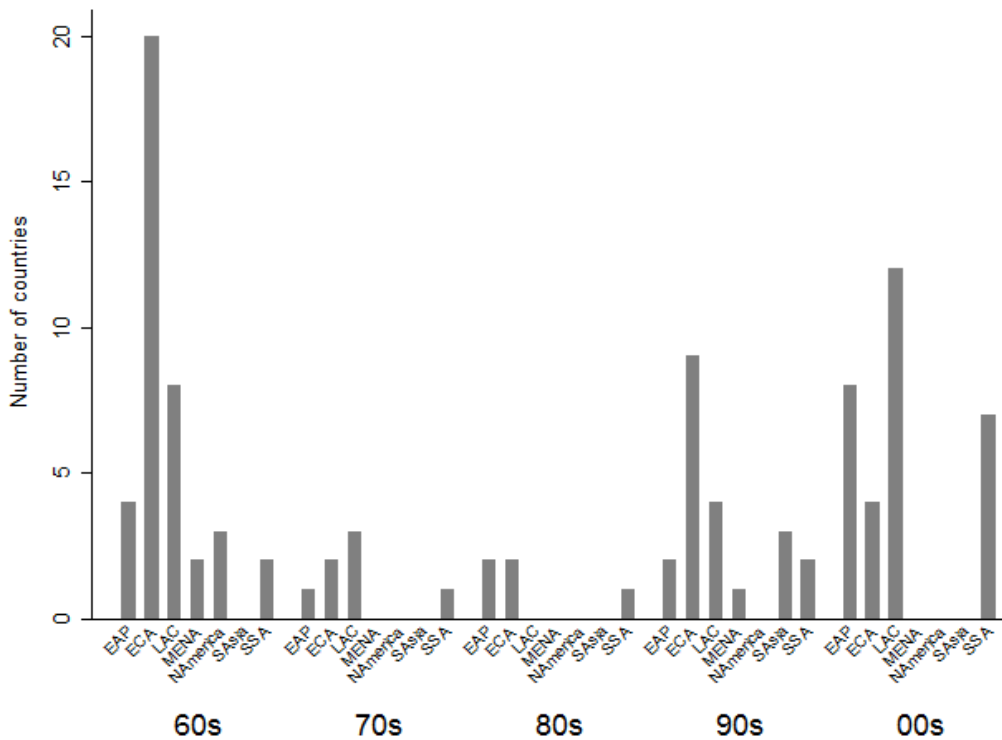
Chapter III

In Chapter III, the provision of social pensions is analyzed. Social pensions refer to non-contributory funds that provide cash transfers to the elderly with little or no link to previous contributions or work history. They are supposed to be an effective tool to tackle low coverage rates of earnings-related pensions and to counteract old-age poverty (Willmore, 2007; World Bank, 2009; ILO, 2014; UNDP, 2014). A new comprehensive data set on 185 countries observed on an annual basis over the years 1960-2012 offers the opportunity to examine trends and the distribution of social pension provision in the last five decades. Previously, the literature on social pension has not examined a comprehensive sample of countries, and therefore little is known about its distribution and trends. However, large variations of social pension provision exist worldwide which shows that previous studies only partly acknowledged the importance of the phenomenon when focusing on a specific country group (i.e., OECD countries). Figure 2 shows the adoption of social non-contributory pensions since 1960 across world regions.

Figure 2 shows that Europe has the greatest coverage with 20 countries providing social pension already in the 1960s. In each decade following the 60s, several countries in Europe and Central Asia have adopted a non-contributory pension, amounting to 38 countries in 2012 or a share of 67 percent. An interesting trend in Figure 2 is also visible in Latin America, where a constant increase of countries adopting social pension is observed. In 2012 a share of 63 percent (26 countries) provides social pension in this region. Similarly, a steady increase in the provision in East Asia and the Pacific, with a share of 39 percent (14 countries) in 2012, is visible. It should be noted that in the 1980s, when the focus of both international and national policy was on privatization efforts in the course of the Washington Consensus,⁴ the introduction of social non-contributory public pensions slowed down worldwide. Regions that lag behind in provision levels are the Middle East, Northern Africa and Sub-Saharan Africa, where implementation is rarely noticeable from 1960-2012.

⁴ The Washington Consensus is named after the headquarter location of Washington DC based international organizations such as the International Monetary Fund (IMF), World Bank and the US Treasury Department. It is a set of economic market-based reforms which formed lending conditions for credits from these institutions for many crisis struck Latin American countries. The consequence was privatization in different economic spheres (Gore, 2000).

Figure 2: Social pension provision per region



Notes: Own calculation based on ILO (2014). EAP = East Asia and the Pacific, ECA = Europe and Central Asia, LAC = Latin America and the Caribbean, MENA = Middle East and North Africa, NAmerica = North America, SAsia = South Asia, SSA = Sub-Saharan Africa. The data for the 1960s include implementation of social pension which took place earlier.

After the description of facts and figures in Chapter III, country characteristics are investigated in more detail that shape the provision of social pension. The political economy literature of social security spending and on the supply of public goods provides a useful platform to derive testable hypotheses.

These hypotheses are:

Hypothesis 1: The provision of social pension is more likely in democratic countries, ceteris paribus.

Hypothesis 2: The strength of governments and its socialist orientation increase the probability of social pension provision, ceteris paribus.

Hypothesis 3: International leverage through trade and aid provision increases the probability of social pension implementation, ceteris paribus.

The theoretical and empirical results show that economic and demographic factors shape state capacity, efficiency concerns, and financial viability as well as the demand for social pension provision. These form the core variables. However, economic and demographic

variables play a different role for developed and developing countries. In countries where traditional intergenerational support structures break down, due to falling fertility rates the demand for public old-age support increases. Consequently, the probability of social pension adoption rises as well. In developing countries state capacity is systematically related to the adoption. Traditional family support is still strong in many low income countries, but the projected demographic trends may make public support necessary. The provision of social pension hinges on the capacity of states to provide public funds, which is necessary to satisfy this future demand.

In terms of political economy factors the study shows that, compared to autocratic regimes, democracies have a higher probability of social pension introduction, foremost in developing countries. The effect increases when the system is older and more stable. In countries with more fractionalized governments the probability of social pension adoption decreases. This effect is particularly strong in the case of developing countries. Socialist governments are more inclined to state interventions, which in developed countries seem to increase the probability of social pension provision.

Although Chapter III does not address the effectiveness of social pension provision, the findings show important factors that are systematically related to the provision of public funds targeted to disadvantaged populations. Structural reforms that focus on old-age poverty reduction may take these results into account to increase the viability of social pension systems.

Chapter IV

In Chapter IV (joined work with Lukas Figge), the change in human demands and implication on environmental degradation are addressed. International “green” initiatives and agreements try to curb climate change and environmental stressors, and to stop the increased depletion of resources. Against this background, Chapter IV provides a systematic analysis of the drivers of the Ecological Footprint (EF). The EF is the most complete measure of human demands on the environment. It includes six bio-productive land-use types: i) cropland, ii) grassland and pasture (food and fiber), iii) fishing grounds (seafood), iv) forest land (timber and paper products) as well as v) areas required to build infrastructure (e.g., roads and buildings), and vi) land for carbon sequestration. The EF thus aggregates a wide range of human demands on the environment. It is also available for different perspectives of human environmental demands – consumption, production, imports and exports. While the relationship between ecological pressures and globalization is often claimed to be unambiguously positive, there is a substantial gap in the literature regarding systematic evidence. The analysis in Chapter IV fills this gap by empirically disentangling the nexus between globalization and ecological pressure. At the same time, the analysis takes the multidimensionality of both concepts into account, extending the view beyond international trade. Globalization is measured by the KOF index, including three dimensions: economic, political and social globalization (Dreher, 2006; Dreher et al., 2008).

The presented empirical analysis is based on information for 146 countries observed over the 1981-2009 period. The Extreme Bounds Analysis (EBA), as suggested by Sala-i-Martin (1997), Sturm and De Haan (2005) and Gassebner et al. (2010b), is applied to test a variety of earlier findings in the environmental sociology and ecological economics literature and to identify a robust set of control variables. The construction of the EF further allows disentangling the relation between components and dimensions of ecological pressure. For instance, globalization may be differently related to human environmental demands of non-carbon or carbon pollutants.

In terms of globalization six hypotheses disentangle the complex relationship between economic, political and social globalization:

Hypothesis 1.1: Economic globalization helps in the diffusion of clean production and creation of markets for the global environment decreasing ecological pressures.

Hypothesis 1.2: Economic globalization intensifies "dirty production" and displacement of pollution which increases ecological pressures.

Hypothesis 2.1: Political globalization creates global environmental governance that still lags behind in managing adverse environmental effects increasing ecological pressures.

Hypothesis 2.2: Political globalization creates a global environmental governance structure that through joint capacity decreases ecological pressures.

Hypothesis 3.1: Social globalization increases global environmental awareness and thereby decreases ecological pressures.

Hypothesis 3.2: Social globalization shapes cultural distancing through global mobility and physical distancing of local environmental degradation.

The results suggest that globalization is related to ecological demands in various ways. While we do not find a robust relation to the EF of consumption, we do find that human pressures through imports and exports are positively and robustly correlated. The most important factor of multidimensional globalization seems to be social globalization through personal contacts, information, and cultural proximity, which is negatively related to the EF of consumption and production. With regard to the EF of imports and exports, we find a negative relation. Socially globalized societies seem to sustainably care about both their national consumption and production, whereas these societies are more ignorant when it comes to imports or exports. This finding suggests a transfer of ecological pressures to other countries. As expected, we find that economic globalization is positively associated with environmental degradation, however, not consistently across EF perspectives. Political globalized is found to be of lesser importance.

In a set of sensitivity tests we address endogeneity concerns in terms of reverse causality and omitted variable bias. We find evidence that globalization affects ecological pressures; however, we cannot rule out reverse causality for all dimensions of globalization.⁵ The same holds for potential omitted dynamic factors that might jointly affect the Ecological Footprint and globalization. No clear results are obtained through the application of system GMM estimators which suggests that we cannot entirely rule out endogeneity concerns.

In summary, Chapter IV shows that globalization and ecological pressures are multidimensional concepts with diverse interlinked causal pathways. The investigation of the nexus between the two phenomena adds to the literature new insights that go beyond claims of single determinants, such as standard of living.

⁵ Migration flows indicate that environmental degradation triggers international migration leading to increased mobility and social globalization which would suggest the reverse direction of causality (e.g., UNEP 2012).





CHAPTER I

MODERN DAY SLAVERY:

WHAT DRIVES HUMAN TRAFFICKING IN EUROPE?*

with Diego Hernandez (Heidelberg University)

Keywords: Human trafficking, gravity model, illegal migration, international organized crime

JEL classification: F22, J61, K14, K42, O17

* This study has been published in *European Journal of Political Economy* 38, 118-139. We thank Arye L. Hillman and two anonymous referees for their comments that greatly improved the paper. The authors cordially acknowledge the generous funding provided by the European Commission (JLS/2009/ISEC/AG/005).

I. 1 INTRODUCTION

The past few decades have seen an increase in migratory flows between countries. These flows have been facilitated and fueled by decreased costs of communication and transportation and people's desire to move to more prosperous and politically stable regions. The combination of the means and desire to migrate with strict border controls and limited working opportunities for foreigners in destination countries creates a fertile ground for the development of organized criminal organizations that deal in illegal migration services. Human trafficking (HT), often acknowledged to be “modern day slavery”, bases its source of profits on the exploitation of human rights by using people as commodities.⁶ In an effort to raise awareness and to seek a joint solution to this form of crime, the United Nations (UN) issued its Protocol to Prevent, Suppress and Punish Trafficking in Persons, defining human trafficking as “the recruitment, transportation, transfer, harboring or receipt of persons, by means of the threat or use of force or other forms of coercion, of abduction, of fraud, of deception, of the abuse of power or of a position of vulnerability or of the giving or receiving of payments or benefits to achieve the consent of a person having control over another person, for the purpose of exploitation.” For instance, the U.S. Department of State (2006) states that between 600,000 and 800,000 people fall victim to trafficking mafias every year. The International Labor Organization (ILO, 2005) estimates that at least 2.4 million adults and children are victims of forced labor and sexual servitude as a result of trafficking in persons (TIP). Revenues from this form of exploitation are calculated to be at least US \$30 billion annually, making human trafficking the most profitable illicit activity after drug and weapon smuggling (ILO, 2005; Interpol, 2009).

Despite the magnitude of these figures, few quantitative studies have been done in this area. This is mainly because acquiring the relevant data is difficult and its collection process is not homogeneous across countries. Uniform data collection is largely affected by government effectiveness in identifying relevant actors (both victims and traffickers), as they belong to the “hidden population” (Heckathorn, 1997). In addition, given how politicized the topic is, identification efforts may be directed towards specific human trafficking

⁶ “Modern day slavery” is widely used to describe the phenomenon of human trafficking and its characteristics today in delimitation to the historical slave trade. See for instance Danailova-Trainor and Laczko (2010).

segments, above all sexual exploitation (Tyldum and Brunovskis, 2005). Therefore, the scarce quantitative research on human trafficking bases its analysis on self-constructed estimations and proxies or on surveys implemented for specific case studies. Despite the importance of these approaches, they limit comparability and impede identification of relevant factors driving human trafficking. Recent attempts to empirically address the subject are a response to the increased attention human trafficking has received internationally.

One part of the literature focuses on the impact and effectiveness of policies combating human trafficking (Di Tommaso et al., 2009; Akee et al., 2014; Avdeyeva, 2010; Simmons and Lloyd, 2010; Cho and Vadlamannati, 2012). In line with this strand of research, Cho et al. (2014) have developed an anti-trafficking policy index measuring the three main dimensions of the fight against trafficking: prosecution, protection and prevention.⁷ A second and less developed strand of the literature focuses on the analysis of TIP by using binary outcome measures. Akee et al. (2010, 2014) consider factors in the countries of origin and destination of victims within a binary gravity-type model.⁸ With a similar methodology, Akee, Basu, Chau and Khamis (2010) highlight the importance of ethnic fragmentation, conflict and internally displaced persons in source countries as determinants of trafficking flows. Cho (2015) models the determinants of human trafficking in- and outflows by using an extreme bounds analysis for numerous push and pull factors in a cross-country analysis.⁹ These results show that crime prevalence, institutional quality and vulnerable conditions of migrants all influence the level of human trafficking.

The above four studies provide some initial insights into the factors driving human trafficking – migration flows, institutions, regulations on TIP as well as crime prevalence. We build on this literature by extending the analysis to human trafficking victim flows to Europe and identify robust determinants. Government efforts have been undertaken in recent years to construct more comprehensive and reliable databases on TIP victims. Several

⁷ Thus, the index is called the 3P Anti-trafficking Policy Index. It is available at <http://www.human-trafficking-research.org/>.

⁸ The binary variable indicates the reporting of at least 100 victims of human trafficking between a specific source and host country. This is based on the US Department of State TIP Report (2003) and the Protection Project (2002) Human Rights Report.

⁹ This study makes use of information on total in- and outflows per country, rather than bilateral flows. In addition, given its cross-sectional nature, it disregards the change of victim flows over time.

official institutions in Europe systematically collect such data, which to date remain largely unexplored.¹⁰ These national reports include the number of TIP victims observed in a country in a given year, as well as the nationality of every victim. Their identification is largely based on the TIP definition provided by the Protocol to Prevent, Suppress and Punish Trafficking in Persons (United Nations, 2000a), guaranteeing that the statistics are comparable across European countries. According to The Global Report on Trafficking in Persons (UNODC, 2009a) Europe is one of the top destination regions for human trafficking, and all countries under study are classified among the largest recipients of TIP victims in this document.¹¹ The International Organization for Migration (IOM) has recorded the largest proportion of TIP cases in Europe (IOM, 2011). Analyzing Europe as a major destination region thus provides us with detailed insights into the trafficking process in this region. The data obtained for this study describes the intensity and direction of TIP flows, enabling a consistent and accurate analysis of the flow of victims between countries.

This paper contributes to quantitative studies of human trafficking flows in three important ways. First, it is based on the analysis of officially recorded victim flows, which are more accurate in describing their pattern than other self-constructed estimations or proxies used in previous studies. By employing a fixed-effects set-up and controlling for data collection and reporting institutions, we show that the data are comparable across reporting countries. Second, given the inclusion of multiple host countries, our model allows for the analysis of the characteristics of countries where victims are exploited, which is a relevant factor in shaping the direction of TIP flows. Finally, as our data set contains information for several years, our study captures the evolution of policies over time, namely those during the expansion of the European Union.

The gravity-type model of TIP flows from 120 countries worldwide to 13 host countries over the 1998-2009 period shows that human trafficking into Europe occurs via well-established migratory and refugee routes. In addition, the findings suggest that victims

¹⁰ Institutions include official anti-trafficking centres, national police offices, and ministries of interior and immigration offices, among others. A complete list of institutions contacted for this study is given in Table I. 1.

¹¹ Other important destination countries for victims of TIP outside Europe had not published comprehensive figures on the size and origin of victim flows at the time this research was conducted.

more often originate from source countries whose nationals do not require a visa for short term visits, and they are more likely to be exploited in host countries with low levels of institutional quality. We also find that recognition rates of asylum seekers and the legislation of prostitution in host countries do not affect trafficking flows significantly.

The remainder of the chapter is structured as follows: Section I. 2 describes the phenomenon of human trafficking and presents preliminary figures. We discuss our hypotheses regarding host and source countries in Section I. 3, while Section I. 4 describes the data set and outlines the empirical strategy used. Section I. 5 shows the results, revealing which factors are crucial in the determination of TIP in Europe. Finally, in Section I. 6, we summarize and draw conclusions.

I. 2 FRAMING HUMAN TRAFFICKING

Human trafficking is a complex, multi-national issue that requires a shared definition across countries to effectively measure and stop it. The most precise definition of TIP is given by the Protocol to Prevent, Suppress and Punish Trafficking in Persons (also called the Palermo Protocol), issued in December 2000 and adopted by the United Nations.¹² The Protocol is the most serious attempt to internationally harmonize the definition of human trafficking covering not only exploitation in prostitution, but also other forms of social and economic misuse, as well as forced organ donation. It also highlights three core components of trafficking, namely the use of deception or coercion, the movement or harboring of an individual, and the placement of the individual in exploitative situations. All host countries considered in this study have signed the Protocol. It obliges states to make TIP a criminal offense and take measures to combat it and every form of exploitation in which it occurs, regardless of the sector.¹³ Regional programs encouraging the prosecution of offenders and protection of victims, such as the EU Framework Decision on Combating Trafficking in

¹² The Protocol to Prevent, Suppress and Punish Trafficking in Persons is a supplement to the United Nations Convention against Transnational Organized Crime, together with the Protocol against the Smuggling of Migrants (United Nations 2000b). Both were issued in December 2000. In addition, the UN inaugurated a Global Initiative to Fight Human Trafficking (UN.GIFT) in 2007 (www.ungift.org).

¹³ From our countries of focus, Austria, Belgium, Denmark, Finland, Greece, Netherlands, Portugal, Spain, Sweden and the United Kingdom signed the protocol in December 2000, Poland in October 2001, and Czech Republic and Switzerland in December 2002.

Human Beings (2002), require national legislation in anti-trafficking to be consistent with the directives and definition of TIP given by the Protocol. Narratives and figures from national trafficking in persons reports across the countries analyzed are, therefore, expected to follow the specifications of the Protocol.¹⁴

To get a first impression of the phenomenon the Global Report on Trafficking in Persons (UNODC, 2009a) presents an insight into the business of human trafficking worldwide. Observing the distribution of victims, it becomes clear that women are the main targets of traffickers, comprising 66 percent of all identified victims (*ibid.*: 11). The report maintains that trafficking in women and girls for the purpose of sexual exploitation is the most common case of human trafficking, accounting for 79 percent of all cases identified. Trafficking for the purpose of labor exploitation is the second most common, accounting for 18 percent of all cases identified. Existing evidence suggests that more than a fifth of all victims are children.

In order to understand the multidimensional process of trafficking used below to develop our hypotheses, the modus operandi of trafficking are described and clarified. Human trafficking-based criminal organizations can range from individual operators, such as freelancers, to highly structured organizations, such as organized criminal networks (UNESCO, 1994; Savona et al., 1996; Schloenhardt 1999; U.S. State Department, 2003). The largest profits are realized during the exploitation or selling of individuals in the destination country, which is possible through physical coercion, fraud or deception at any point during the trafficking process, and is made easier when victims owe debts to traffickers. Human trafficking does not necessarily involve illegal international border crossing. In some cases, potential victims can legally enter the country of destination with official documents after they have been promised a job as waitress, model or construction worker, for example, and only realize their victimization upon arrival. In other cases, individuals can enter the country with a valid short-term visa and accept a job offer that requires them to remain in the country illegally after the document expires. In such situations, individuals often have to

¹⁴ In addition, The Hague Program (2004) and Stockholm Program (2009), the main guidelines for justice and home affairs for member states of the EU, stress the importance of international harmonization on data collection in the area of human trafficking.

pay exorbitant amounts of money for the journey to the host country and/or their legal documents might be retained, facilitating exploitation (Aronowitz, 2001).

Accordingly, there are three broad scenarios in which people might fall into the hands of traffickers: in the first case, an individual willing to migrate contacts a border crossing service and either before, during or after the crossing is made, incurs a debt to the traffickers. If the client has outstanding debts it sharply increases the chances of them being exploited and psychologically and physically coerced. In the second scenario, individuals are deceived by a job offer abroad that appeared legitimate, and are then forced to work under exploitative conditions upon their arrival. In these cases, their personal identification is usually removed from their belongings and they are physically coerced to remain within the criminals' space of influence. The final scenario is one in which individuals are kidnapped in their home country and transported against their will to a different place, where they are subsequently exploited.¹⁵ These modus operandi of traffickers play an important role in identifying the factors that determine TIP. Taking the different trafficking scenarios into account, in the next section we closely examine the possible determinants of human trafficking.

I. 3 DETERMINANTS AND HYPOTHESES

We now identify country characteristics influencing the direction and intensity of TIP flows. Many of these characteristics have been discussed in other papers investigating human trafficking (see e.g., Mahmoud and Trebesch, 2010; Jakobson and Kotsadam, 2013; Cho, 2015). A summary of the ideas is presented to develop testable hypotheses.

Every factor shaping and strengthening international movements of people is categorized as either a "pull" or "push" factor (Ravenstein, 1885, 1889; Sjaastad, 1962; Lee, 1966). Push factors are source country characteristics that trigger outflows of people or increase the pressure to leave the country. Such factors also support human trafficking outflows, because the higher the willingness to emigrate, the more likely it is that an

¹⁵ One can imagine an additional situation in which victimization can occur when parents send their children away in the hope that they will gain better living or economic conditions (Jac-Kucharski, 2012). Such a scenario mainly takes place inside national borders, and is therefore not captured in our data as we cover international victim flows.

individual will come into contact with trafficking organizations. Pull factors, on the other hand, are conditions in host countries that attract migratory inflows. Trafficking flows also react to such factors, since the main targets of trafficking mafias are vulnerable groups among the population that are highly exposed to exploitation (Stark, 1991; Castles and Miller, 2003). Large costs for traffickers lie in finding potential victims. In cases of well-established routes for migrating and refugees, this cost is greatly reduced, creating an ideal market for traffickers (Salt and Stein, 1997).

Generally, criminal organizations prefer to look for victims where it is less costly to do so (push factors), transporting them through less risky routes, and exploiting them where revenues are higher (pull factors) (Schloenhardt, 2001). We include factors facilitating trafficking activities in countries of recruitment and exploitation, which equally impact upon mafia profits and decisions on where to locate in order to identify the most important aspect. Following the literature, we cover conditions in host and source countries affecting the three aforementioned scenarios of the human trafficking business. These factors are grouped within one of the following categories (Cho, 2015): movement of people, institutional quality and regulation, crime, and women's rights.¹⁶ We now develop empirically testable hypotheses.¹⁷

I. 3.1 Movement of people

The international movement of people is an essential component of human trafficking. The expectation of higher income, better living conditions, and greater employment opportunities abroad encourage the choice to migrate. Theoretically it is plausible to assume that people are inclined to take the risk to migrate when the income gap is high, even if they have a stable source of income in their home country (Harris and Todaro, 1970). In empirical works this assumption has been challenged, with mixed results (Sjaastad, 1962; Rotte and Vogler, 1998). An identified trigger for migration into developed countries is a generous welfare system in the destination country, which attract individuals even without job

¹⁶ The grouping of the determinants into the four pillars as well as the selection of some variables follows Cho (2015). A preliminary version of this work was presented in a joint project meeting in the University of Goettingen in May 2010.

¹⁷ Table A I. 3 gives an overview of the literature and corresponding hypotheses. Table A I. 4 summarizes our hypotheses, variables and results.

certainty (De Giorgi and Pellizzari, 2009; Jean and Jimenez, 2011). Turning to the perspective of criminal organizations, it is advantageous to carry out human trafficking operations in countries that have a potentially sizeable population willing to migrate. This creates a large potential market for those offering smuggling services and/or the (false) promise of international job prospects.

Evidence suggests that high income countries have a substantial demand for cheap labor in insecure and informal service sectors (for instance domestic and factory work, and prostitution) as such positions are rarely filled by nationals (ILO, 2003; O'Connell, 2011).¹⁸ Given this market fragmentation and restricted opportunities for legalization, migrants are left with no other option than to subsist in the shadow economy (Friebel and Guriev, 2006; Akee et al., 2010).¹⁹ Poor labor conditions in informal services make the exploitation and strict control of victims possible, which, together with language barriers and the fear of deportation, deter victims from seeking legal support. Belser (2005) asserts that the vulnerable situation of migrants combined with the high demand and large profits from offering informal services in host countries creates an ideal environment for traffickers seeking high exploitation yields. Profits from sexual exploitation in industrialized countries are calculated to be around US\$ 15.5 billion per year, making up half of all profits made worldwide in this sector (ibid.: 14). We thus conclude that income differences and population size of countries matter for victim flows.

Geographical distance between countries of origin and destination is also relevant regarding the pattern of international movements of people. Wealthier countries that are geographically closer are preferred as destinations for migration due to the fact that shorter journeys reduce costs and risks (see, e.g., Greenwood, 1975; Jac-Kucharski, 2012). Similarly, professional traffickers prefer to locate their recruitment and exploitation activities closer to each other as moving victims within shorter distances minimizes logistical complications, transportation costs, as well as the risk of detection.

¹⁸ These insecure and informal positions are called "3-D jobs: dirty, degrading and dangerous" (ILO, 2003: 4).

¹⁹ Since 1992, European countries limited accessibility to their territory beyond the existing restrictions impeding economic and non-economic migration, especially for asylum seekers and refugees. (Zaiceva and Zimmermann, 2008). The role of this migrant population is further explored in Section I. 4.2.

Finally, criminal organizations can take advantage of well-established migratory flows. Using existing, often-used migratory routes makes sense for traffickers as it reduces costs and the chance of being caught. Joint logistic operations of recruitment, transportation and exploitation are simplified if criminal organizations are certain about where potential victims are coming from, and where they wish to go. The involvement of traffickers within migration networks makes it easier to manipulate the trusting relationships that exist between friends and relatives of an individual crossing an international border. Mahmoud and Trebesch (2010) show the importance of networks and family ties in a small set of Eastern-European countries. For these reasons, trafficking should occur more often within areas which exhibit intense migratory flows. A similar argumentation applies for established refugee flows. Besides possessing very similar characteristics to migrants, this population, given its vulnerable nature, is also willing to give up certain liberties and even accept being exploited in order to reach a destination. Both populations can be classified as people at risk of being trafficked (Mahmoud and Trebesch, 2010; Akee, Basu, Chau and Khamis, 2010). Traffickers will be highly interested in focusing their activities along the travel paths of both groups. Based on this reasoning, we formulate the following hypotheses:

- Hypothesis 1a: More intense human trafficking flows are observed within country pairs that have larger income differentials.*
- Hypothesis 1b: Human trafficking is most likely to occur between countries with larger populations.*
- Hypothesis 1c: Flows between countries are larger if the countries are geographically closer to each other.*
- Hypothesis 1d: Well-established routes for migrants and refugees encourage human trafficking and increase the number of victims.*

I. 3.2 Institutional quality and regulation

Institutional quality and regulatory factors determine the capacity of governments to uncover and prosecute criminal actors. Legal enforceability is guaranteed by the effectiveness of the prevailing institutions and the ability of the judicial system to prosecute traffickers. Human trafficking organizations therefore locate their operations where the probability of detection and conviction is low. Poor law enforcement and low risk of exposure when carrying out illicit activities are associated with larger informal economies

and higher rates of undetected crimes – ideal conditions for trafficking activities to flourish (Friedman et al., 2000). The quality of institutions also impacts the effectiveness of government efforts to protect vulnerable populations, including TIP victims. These activities comprise the control of international borders and legislation on commercial sex services. Furthermore, social trust has been shown to be related to institutional quality as well as to illegal activities and the size of the informal economy, on which many victims subsist (Bjørnskov, 2011; D'Hernoncourt and Méon, 2012).²⁰ This applies to both victims' country of origin and destination.

Border controls in destination countries should affect the scope of trafficking operations. We capture the entrance regulations into destination countries by using two measures: visa requirements to enter a host country, and recognition rates of asylum applicants. These two elements reflect border controls for migrants and refugees, respectively. First, the effect of visa requirements on the intensity of human trafficking is a priori unclear. On the one hand, when an international border is closed, a trafficking opportunity is created because unwanted immigrants will look for assistance in crossing the border illegally (Feingold, 2005; Gathmann, 2008; Akee et al., 2010; Mahmoud and Trebesch, 2010). The ILO (2003) reports that the trafficking business becomes increasingly lucrative in response to this observed increase in demand. On the other hand, it can be argued that when an international border is open, traffickers will face little risk and low transportation costs when bringing victims to destination countries where labor demand in the informal sector is growing (ibid: 4). As mentioned in section I. 2, international borders do not necessarily need to be closed for human trafficking to occur. Migrants can cross international borders legally with a short-term visa but remain in host countries longer than they are legally allowed. Once they have gained an illegal status, migrants often turn to the shadow economy as the only possible source of income, where exploitation, and therefore trafficking, is commonplace (ibid). In the European context, the question of the direction of the effect of border controls on human trafficking is especially relevant; the expansion of the European

²⁰ Nunn and Wantchekon (2011) find that in South Africa social trust and slavery are directly related. The authors look at the impact of slavery on trust relationships today and find a negative correlation. Although they argue that causality runs from slavery to trust, the impact of trust on trafficking seems plausible, because a lack of social trust probably reflects a lack of moral norms that would prevent human trafficking.

Union in the last decade has brought substantial changes regarding bilateral border controls.²¹

Turning to recognition rates of asylum seekers, these illustrate the willingness of a country to receive international refugees. As before, the effect of rigid requirements on refugees wishing to settle within a country is also a priori unclear. If refugees lack the legal means to remain in a country, they are more likely to seek the help of criminal organizations and consequently are exploited (Friebel and Guriev, 2006). In contrast, granting legal status to victims might increase the incentive to traffic. As the stock of potential victims in destination countries declines, the returns from exploitation soar, promoting further trafficking (Akee et al., 2010, 2014). This paper seeks to reveal the direction of this relationship by analyzing the declining trend of asylum acceptance rates in European countries over the last decade.²²

As referred to above, the victims of trafficking are often subjected to sexual exploitation. We therefore expect levels of prostitution legislation to play a key role in determining trafficker's choice of destination countries; these levels determine the expected payoffs from and opportunities to exploit. Several empirical studies have already explored this relationship (e.g., Di Tommaso et al., 2009; Akee et al., 2014; Jacobson and Kotsadam, 2013; Cho et al., 2013), but there is still no consensus on the statistical significance or direction of the effect of commercial sex activity legislation and levels of trafficking. There are two diametrically opposed lines of argumentation: abolitionists and supporters. Abolitionists claim that prohibiting prostitution activities considerably reduces the room for trafficking to occur in the commercial sex market, and thus expected profits (Aghatise, 2004; Jakobson and Kotsadam, 2013). Supporters, on the other hand, argue that legalizing commercial sex services reduces the price paid for prostitution and the opportunity for exploitation, consequently reducing trafficking incentives (Feingold, 2005; Akee et al., 2014).²³ We contribute to finding an answer to this debate, by examining the additional effect

²¹ For detailed information on bilateral visa requirements in the European Union, please refer to EU Council Regulation (EC) No. 539/2001 of March 15th 2001, and its subsequent updates in 2004, 2005, 2007 and 2009.

²² For comprehensive statistics on asylum recognition rates, we refer to UNHCR (2009).

²³ The result in Akee et al. (2010) for legislation on prostitution in host countries is not robust. The effect becomes insignificant when controlling for law enforcement.

of regulating the market for sexual services, after controlling for the level of law enforcement in host countries. We expect legislation on prostitution to have differing effects on trafficking opportunities and risks, depending on the capacity of a government to implement and monitor such legislation.

Finally, we expect that the level of social trust in destination and source countries will play a role in determining the levels of TIP flows. In their study of developing and developed countries, D'Hernoncourt and Méon (2012) find a negative relationship between social trust and the size of the informal economy in relation to the formal economy's share of total economic activity. Bjørnskov (2011) also shows that an increase in social trust decreases corruption significantly and is correlated with better institutional quality. Therefore we expect social trust to reduce opportunities to exploit victims in host countries via improved institutional quality and contracted informal economies. We also anticipate that social trust in source countries reduces the probability of victims being deceived. In summary, we hypothesize the following:

Hypothesis 2a: Legal enforceability in host and source countries impacts TIP flows negatively.

Hypothesis 2b: After controlling for legal enforceability, visa requirements in host countries and acceptance rates of asylum seekers further impact human trafficking; the direction of the effect for both aspects is a priori ambiguous.

Hypothesis 2c: Considering the level of legal enforceability, legislation on prostitution affects trafficking opportunities. The direction of the effect is a priori ambiguous.

Hypothesis 2d: Social trust reduces TIP flows in both host and source countries.

I. 3.3 Crime

Trafficking flows should flourish in countries with higher levels of criminal activity. Due to its scale and international nature, TIP relies on the support of intermediaries at every stage of the process. These intermediaries operate during the recruitment stage, where they offer individuals misleading job offers abroad; in the mobilization stage, where they illegally traffic individuals across international borders; and in the exploitation stage, where criminal organizations realize most of their revenue (Salt and Stein, 1997). Coordination among intermediaries during these three core phases is often guaranteed by larger international criminal organizations flexible in adapting to a constantly changing environment (Bruckert

and Parent, 2002; Salt, 2000; Stoecker, 2000). To some extent, trafficking mafias are likely to work jointly with businesses engaged in other illicit activities (drugs or arms trafficking, for example). Schloenhardt (2001) describes how criminal enterprises tend to share similar risks, such as being discovered and being forced to dismantle their operations along trafficking routes and prosecution. Evidence suggests that traffickers can take advantage of the presence of well-established criminal networks in order to commence or even deepen their activities. As a result, human trafficking is frequently part of a broad portfolio of activities carried out by large criminal organizations. Europol states that “criminal groups are increasingly multi-commodity and poly-criminal in their activities” (2011: 5), indicating that TIP can be seen as an opportunity for criminal groups to diversify their operations and spread their risks.

Given the difficulties involved with homogeneously defining crime (especially in a multi-country context), as well as with measuring an activity whose actors are part of the underground population, we evaluate the extent of criminal activity by observing offenses which have a high probability of detection, such as homicides (Bruckert and Parent, 2002; Soares, 2004). Based on the above we expect that:

Hypothesis 3: Trafficking flows are more common between country pairs with higher levels of criminal activity.

I. 3.4 Gender dimension

Finally, as the majority of human trafficking victims are women (see section I. 3.1), hostile societies towards them could increase recruitment opportunities for traffickers and thus increase victim numbers. Besides regular “push” factors, female migration is decisively affected by their social roles and their capacity to make decisions and exert autonomy in their country of origin (United Nations, 2006). Consequently the pressure for females to migrate and their likelihood of being trafficked rises as women’s degree of political participation and/or employment opportunities deteriorate. Cho (2013) finds that this effect is enhanced when the abuse and exploitation of foreign women is widely tolerated in a society. When societies allow women to be active and equal participants their chance of being exploited decreases as their general awareness of and ability to avoid trafficking

operations increases (Mahmoud and Trebesch, 2010; Cooray and Potrafke, 2012). Therefore, we expect that women with more equal and secure rights in a society should be less likely to be trafficked.

On the other hand, however, the scope for international human trafficking should also be small if the norms of a society severely restrict women's rights. Such societies do not allow women to make their own decisions, e.g., socializing with people other than close relatives or moving from one place to another.²⁴ As a result, women are prevented from establishing contact with groups involved in human trafficking. If women are under constant supervision from their families and are not allowed to participate in the labor market or travel abroad, for example, they will have far fewer opportunities to come into contact with illegal migration services or to look for dubious job offers abroad.²⁵ For this reason, we expect less human trafficking outflows from countries where women's rights are restricted. Taking both arguments into account we anticipate:

Hypothesis 4: There is a non-linear relationship between women's rights and human trafficking. Trafficking is less common in source countries in which women's rights are either fully guaranteed or very deprived.

I. 4 EMPIRICAL ANALYSIS

Our model of the determinants of victim flows uses data on 120 source countries and 13 European destination countries in a gravity-type model, taking Akee, Basu, Chau and Khamis (2010) and Akee et al. (2014) as point of reference. In contrast to these authors our analysis draws on bilateral victim flows, allowing for more precise estimates.²⁶ The following section provides a detailed description of the institutions we contacted, the data set we collected, and the empirical strategy we employ to account for the characteristics of our data.

²⁴ For example, women in Saudi Arabia do not have the right to drive an automobile (BBC News, 2007; New York Times, 2009); and women in Yemen must obtain an approval from their husbands or fathers to receive an exit visa to leave the country (U.S. Department of State, 2004).

²⁵ In line with this argument Potrafke (2013) finds that religion matters for the implementation of anti-trafficking policies: in countries with Christian majorities policies are stricter in the fight against human trafficking compared to countries with Muslim majorities.

²⁶ Please refer to Gassebner et al. (2010a) for a discussion on count variables estimates.

I. 4.1 Data

In order to assess the intensity and origin of human trafficking inflows into Europe, we collected statistics from national institutions across Europe that produced TIP reports.²⁷ These included official anti-trafficking centers, national police offices, ministries of interior, immigration offices, service centers, research centers, and universities.²⁸ To guarantee that victim recognition followed a homogeneous definition, we contacted only those institutions that incorporated the Palermo Protocol in their reports. We requested information on the size and origin of victim inflows to the reporting country on an annual basis. From the 37 institutions contacted, 22 provided us with the information requested, while 10 provided incomplete data, and 5 did not publish their statistics. The list of institutions contacted and a short description of the data is presented in Table I. 1. In those countries where more than one institution provided complete data, the data covering the largest period were chosen for the analysis.²⁹ It is also worth noting that neither France nor Italy collect data on victims of human trafficking following the standards of the Palermo Protocol, while Germany only partially publishes its TIP statistics. Therefore, these three countries were excluded from the analysis.³⁰ The final data include 13 host countries in Europe and extend to 120 source countries, covering the 1998-2009 period.

²⁷ Identification of victims might also occur in a transit country. However, TIP reports by national institutions include only victims identified after exploitation has occurred, therefore we do not consider countries of transit in our framework.

²⁸ In the EU Parliamentary Directive 2011/36/EU on preventing and combating TIP and protecting victims, issued on April 5, the EU Council and EU Parliament encourage intensified data collection on human trafficking as well as the implementation of national rapporteurs that include “[...] gathering of statistics in close cooperation with relevant civil society organizations active in the field.” Hence, we include data in our analysis from public as well as civil society organizations.

²⁹ This is the case in Belgium, the Czech Republic, Denmark, the Netherlands, Poland, Portugal and Switzerland. In Poland and Portugal, more than one institution provided exactly the same information; in Denmark, the data collection process is split into two institutions, depending on the legal status of victims; in the remaining four countries, the institution that provided the largest series was chosen.

³⁰ In France, the Central Office for the Suppression of Trafficking in Persons produces statistics on victims of soliciting prostitution, while the Central Office for the Fight against Illegal Migration produces statistics on victims of labor and living conditions against human dignity - both statistics do not refer exclusively to TIP. Similarly, in Italy, the Ministry of Interior produces a joint statistic on victims of prostitution and TIP together. The German Federal Criminal Police Office publishes only the 10 largest source countries of victims.

Table I. 1: Institutions providing TIP Victims Statistics used

Institution	Country	Range
Inquiry 1455/J XXIV.GP (Austrian Parliament)	Austria	2005-2008
Institute for International Research on Criminal Policy - IRCP	Belgium	1999-2005
La Strada	Czech Republic	2006-2009
Danish Anti-Trafficking Centre ^a	Denmark	2009
Danish Immigration Service		2008-2009
Hellenic Police (Ministry of Citizen Protection)	Greece	2003-2009
Ruhama	Ireland	2007-2009
National Rapporteur on Trafficking in Human Beings - BNRM ^b	Netherlands	1998-2008
Unit for Trafficking in Human Beings (Ministry of Interior)	Poland	2005-2008
Central Team Trafficking in Human Beings (Police Headquarters) ^c		2005-2008
Observatory on Trafficking in Human Beings (Ministry of Interior)	Portugal	2008-2009
Ministry of Interior ^d	Portugal	2008-2009
National Police Corps of Spain	Spain	2000-2005
Swedish National Criminal Investigation Department	Sweden	2002-2008
Advocacy and Support for Migrant Women and Victims of Trafficking - FIZ	Switzerland	2005-2008
United Kingdom Human trafficking Center - UKHTC (Serious Organized Crime Agency - SOCA)	United Kingdom	2008-2009

Notes:

^a In Denmark, TIP victims legally residing are referred to the Danish Anti-Trafficking Centre, and TIP victims illegally residing to the Danish Immigration Service. The total number of TIP victims is therefore the sum of both figures.

^b Victims identified by the Dutch Foundation against Trafficking in Women (STV Comenscha).

^c Numbers provided by Police Headquarters are the same as the ones from the Ministry of Interior.

^d Numbers provided are the same as the ones of the Observatory on Trafficking in Human Beings.

One concern regarding officially recorded data is the amount of resources allocated to the fight against trafficking and the institutional set up (IOM, 2005). Arguably countries with more resources and sound legal systems might detect more human trafficking and thus report more victims. However, given that we focus mostly on countries that are members of the European Union data collection efforts as well as institutional resources should be similarly allocated to fight human trafficking. We use the 3P-Anti-trafficking Policy Index of

Cho et al. (2014) to scrutinize this assumption. The Index evaluates countries every year according to their performance in implementing policies to directly combat human trafficking, namely prosecution of traffickers, crime prevention and protection of victims. The Index ranges from a minimum of 3 points to a maximum of 15 points.³¹ Twelve of 13 countries received an average index score between twelve and 14 for the 2000 – 2009 period.³² These scores precisely show that policy approaches as well as the overall assessment within countries to fight TIP is comparable and of high standard. In order to account for any data collection differences in the 13 countries under consideration that might still be prevalent we use host country and time fixed-effects in our estimation strategy.

Nevertheless, the information reported by the institutes differs in a number of ways. These characteristics might affect the number of victims reported by each and it is of interest to test the extent to which they affected the recording of flows. Three different data features are identified: first, victim recognition is either done through a public agency or individually. Public agencies recognize victims once the police and the public prosecution service perform investigations. If recognition is done individually, victims declare themselves in service centers, and professionals evaluate whether they present indications of human trafficking. Both types of institutes produce TIP reports and are considered in this study. Arguably, service centers tend to report fewer victims than police forces as they include the number of victims they shelter, and this is constrained by their assigned budget and available accommodation.³³ From the 13 host countries analyzed, three TIP reports were generated by service centers: the Czech Republic, Ireland and Switzerland. Second, reporting institutes also differ in the types of exploitation they reported. Some only included victims of sexual exploitation, while others accounted for additional types (labor, organ removal, etc.). Naturally, the overall numbers reported are likely to be higher when the full set of exploitation types was counted. Indeed, host countries that only included sexual

³¹ More details on the construction and scoring of the 3P Anti-trafficking Policy Index are available online under www.humantrafficking-research.org.

³² Greece was the only country in our sample to score on average lower than 12 points in the 2000 – 2009 period. However, it has rapidly improved over time, receiving a score of 13 points in 2009.

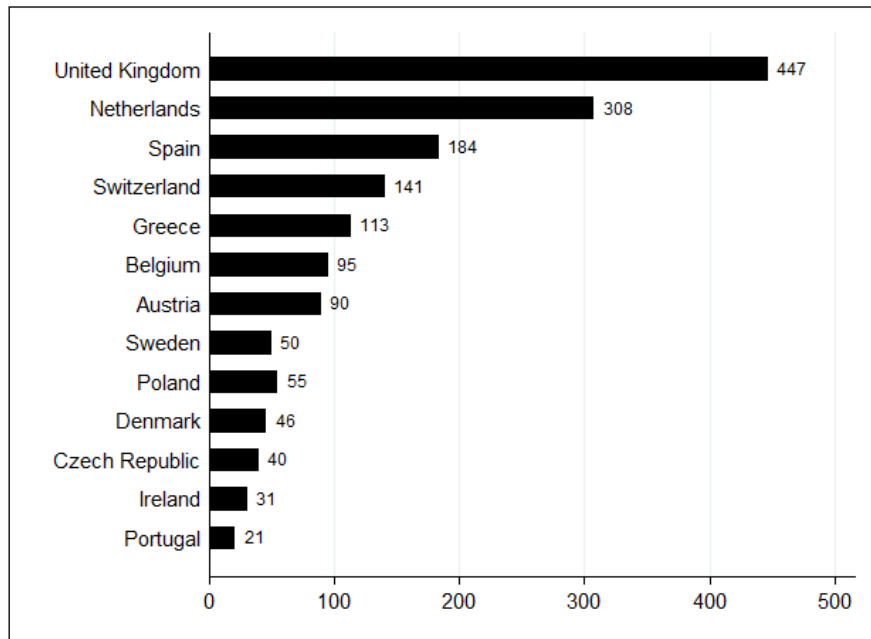
³³ Host countries collecting statistics from service centres report 71 victims yearly on average; national police offices report 140.

exploitation scenarios reported on average 100 victims annually, whereas those that included all exploitation cases on average reported 135 annually. In our sample, Ireland, Spain, Sweden and Switzerland reported only victims of sexual exploitation. This might be a response to the politicization of human trafficking towards this segment in these countries (Tyldum and Brunovskis, 2005). And third, TIP reports also varied in the method used to count victims. Statistics either included the number of confirmed victims or the number of suspected victims (not yet confirmed by prosecution authorities). Source institutions counting confirmed victims reported smaller numbers, as not all persons suspected of being TIP victims turn out to be actual victims. Host countries counting confirmed victims reported on average 91 victims annually, and countries counting possible TIP victims, showed on average 488 victims. Best quality data is expected to come from public agencies, which counted confirmed victims of all types of exploitation, meaning that the reporting entity is fulfilling all three features. We include three data quality control dummies covering these dimensions in a separate specification.³⁴

A description of our data set is provided in Figure I. 1 and Table I. 2.³⁵ Taking yearly averages as the baseline, the United Kingdom and the Netherlands reported the largest numbers of victims per year, 447 and 308 respectively, while Ireland and Portugal reported the lowest numbers, 31 and 21 respectively.

³⁴ As later described in Section I. 4.2, we cannot consider both host country fixed-effects and the three quality controls simultaneously, given that the latter usually do not change over time.

³⁵ The figures in Table I. 2 are comparable to those published in the TIP reports by the U.S. State Department and the UNODC. These statistics provide only registered cases and therefore a lower bound approximation of the actual numbers, as in any other criminal activity. We are aware of this fact and use a carefully designed identification strategy to address these specific characteristics of our data and any possible reporting biases.

Figure I. 1: Reported number of victims per year in host countries

Notes: TIP reports, refer to Table I. 1. 1998-2009 average reported.

Moreover, as can be seen in Table I. 2, the largest proportion of victims originates from Eastern Europe. In nine of the 13 host countries, this region makes up at least six of the top ten source countries of victims. Romania, Ukraine, Russia, Nigeria and Bulgaria are generally the countries of origin of most victims. The distribution of victims is not concentrated among the top 10 source countries in Belgium, the Netherlands, Switzerland and the United Kingdom, with more than 20 percent of the victims originating from outside of this group. The opposite case is true in Portugal and Poland, where only four (Brazil, Mozambique, Romania and Ukraine) and five (Ukraine, Belarus, Bulgaria, Romania and Russia) source countries, respectively, make up the entire number of victims. The origin of victims also reveals that these are nationals from common emigration countries that do not necessarily face strict border restrictions in the European context.

Table I. 2: Source countries of reported victims per year by host countries

Host Cty.: Austria		Host Cty.: Belgium		Host Cty.: Czech Rep.		Host Cty.: Denmark		Host Cty.: Greece	
Source Cty.	Victims	Source Cty.	Victims	Source Cty.	Victims	Source Cty.	Victims	Source Cty.	Victims
Hungary	19	Nigeria	16	Ukraine	12	Nigeria	19	Romania	35
Romania	18	China	9	Bulgaria	4	Thailand	10	Russia	26
Moldova	9	Romania	9	Romania	4	Romania	5	Bulgaria	15
Bulgaria	7	Bulgaria	8	Russia	4	Latvia	2	Ukraine	8
Slovak Rep.	7	Albania	7	Vietnam	3	Slovak Rep.	2	Moldova	5
Belarus	5	Russia	5	Kyrgyz Rep.	3	Ukraine	2	Nigeria	5
Ukraine	4	Moldova	4	Macedonia	2	Cameroon	1	Albania	4
Nigeria	4	Ecuador	4	Slovak Rep.	2	Cote d'Ivoire	1	Belarus	3
Czech Rep.	3	Morocco	3	Brazil	1	Hungary	1	Lithuania	3
Russia	3	Ukraine	3	Indonesia	1	Portugal	1	Uzbekistan	2
Other	14	Other	25	Other	4	Other	2	Other	8

Host Cty.: Ireland		Host Cty.: Netherlands		Host Cty.: Poland		Host Cty.: Portugal		Host Cty.: Spain	
Source Cty.	Victims	Source Cty.	Victims	Source Cty.	Victims	Source Cty.	Victims	Source Cty.	Victims
Nigeria	16	Nigeria	46	Ukraine	37	Brazil	8	Romania	84
Romania	3	Bulgaria	38	Belarus	12	Mozambique	8	Colombia	35
Cameroon	1	Romania	22	Bulgaria	3	Romania	5	Brazil	25
Malawi	1	China	21	Romania	2	Ukraine	1	Russia	7
Zimbabwe	1	Russia	15	Russia	1	Other	0	Ukraine	7
Congo D. Rep.	1	Sierra Leone	15	Other	0			Lithuania	6
Kenya	1	Poland	11					Paraguay	5
Moldova	1	Ukraine	11					Ecuador	3
Somalia	1	Czech Rep.	9					Venezuela	3
Venezuela	1	Hungary	9					Germany	2
Other	5	Other	111					Other	8

Host Cty.: Sweden		Host Cty.: Switzerland		Host Cty.: UK	
Source Cty.	Victims	Source Cty.	Victims	Source Cty.	Victims
Estonia	17	Brazil	29	Nigeria	68
Russia	10	Thailand	25	China	60
Poland	3	Romania	16	Romania	44
Lithuania	2	Hungary	12	Vietnam	33
Romania	2	Bulgaria	8	Slovak Rep.	26
Hungary	1	Dominican Rep	8	Poland	17
Slovak Rep.	1	Russia	5	India	16
Nigeria	1	Serbia	5	Czech Rep.	13
Albania	1	Cameroon	4	Uganda	12
Azerbaijan	1	Ukraine	3	Zimbabwe	11
Other	1	Other	29	Other	150

Notes: TIP reports, refer to Table I. 1. Listed are the first ten source countries with the most victims per year for every host country, all additional countries are aggregated to "other", 1998-2009 average reported.

I. 4.2 Estimation strategy

Our variable of interest is the number of human trafficking cases identified in a host country from a source country within a given year. By employing a gravity-type model,³⁶ these bilateral victim flows are modeled, allowing us to observe the effects of the characteristics of both sending and receiving countries. Our model specification is a zero inflated negative binomial, given two particular characteristics of the dependent variable: left skewed distribution caused by a large proportion of zeros, and over-dispersion.³⁷ Data omissions for a country pair and a given year are assumed to be a true absence of victims rather than a missing value within that flow, given that the origin of every single victim is listed in the TIP reports. This produces a large proportion of zero values. In the raw data set, these account for close to 90 percent of all observations. Moreover, the sample mean and variance for our variable of interest are 0.66 and 18.66, respectively, a sign of over-dispersion.

The first model specification in Eq. (I. 1) includes host country- and source country-fixed-effects to control for unobserved country characteristics.³⁸ In the second specification in Eq (I. 2), host country fixed-effects are not considered given the inclusion of the three data quality dimensions described in the previous section, which are time-invariant within countries. Year dummies are introduced in both specifications to correct for common shocks. Following the use of applied gravity models in the economic literature our basic model setting includes income level differences and population sums of host and source countries, as well as the geographical distance between country pairs. This basic setting is kept fixed and then subsequently enlarged to test the remaining hypotheses. The following equations summarize our model specifications:

³⁶ Gravity models were initially conceptualized in economics of trade to identify the determinants of commercial trade and foreign direct investment flows. They have also been used to examine flows of migration and human trafficking. See, for instance, Anderson and van Wincoop (2003) for a gravity model application on trade flows, Gassebner and Méon (2010) on cross-border mergers and acquisitions flows, Sjaastad (1962), Greenwood (1975), Borjas (1987, 1989), Karemera et al. (2000), and Kim and Cohen (2010) on migration flows, or Akee et al. (2010, 2014) and Akee, Basu, Chau and Khamis (2010) on human trafficking.

³⁷ Following Long and Freese (2006), an assessment of the differences between observed and average estimated probabilities from different count data models suggests the use of a zero inflated negative binomial model in our specification. Furthermore, a zero inflated negative binomial is preferred to a negative binomial specification according to Akaike's and Schwarz's Information Criteria (AIC) and Schwarz's Bayesian information criterion (BIC). The same specification choice is also supported by Vuong's likelihood ratio test (Vuong, 1989).

³⁸ Country pair fixed-effects could lead to incidental parameter problems. If the number of variables in the model is substantially high, estimates might be biased (Neyman and Scott, 1948).

$$victims_{ijt} = const + \beta_G G + \beta_X X + \mu_i + \omega_j + \gamma_t + \varepsilon_{ijt} \quad (I.1)$$

$$victims_{ijt} = const + \beta_G G + \beta_X X + \beta_Q Q + \omega_j + \gamma_t + \varepsilon_{ijt} \quad (I.2)$$

The dependent variable is denoted with $victims_{ijt}$ and is the number of TIP victims reported in host country i , coming from source country j , in a given year t . On the right hand side of the equation, $const$ is the constant and the three variables of our basic setting are grouped in Matrix G. Variables to test our remaining hypotheses are found in Matrix X. Matrix Q contains data quality controls considering the three reporting dimensions. Host country, source country and time fixed effects are specified by μ , ω , and γ , respectively. Our interest lies in the identification of the coefficient vectors β_s ($s = G, X, Q$) and ε is the idiosyncratic error term. All regressions include standard errors clustered at the country pair level to avoid spuriously small p-values. The data sources for our three variables in Matrix G forming the basic model setting are the following:³⁹ Income level differences between source and host countries are calculated using GDP per capita in current dollars provided by the World Development Indicators (WDI) (World Bank, 2010). With this variable we also test Hypothesis 1a. The sum of populations in source and host countries is estimated with the population data from the WDI and tests for Hypothesis 1b. Geographical distance within country pairs is taken from the Institute for Research on International Economy (CEPII, 2010), measuring the distance in kilometers between both countries' largest agglomerations, to test Hypothesis 1c. All three variables are expressed in logs and are maintained as fixed control variables in the subsequent regressions.

The remaining hypotheses are tested with the variables in Matrix X. The stock of migrants and refugees coming from source country j and residing in country i , in a given year, are used for Hypothesis 1d. Both variables are taken from the Eurostat Population Statistics (EUROSTATS, 2010) and the UNHCR Refugee Statistics (UNHCR, 2009), respectively, and given in logs.⁴⁰ Hypothesis 2a is tested with a law and order index for source country j and host country i taken from the International Country Risk Guide (ICRG, 2010). This index accounts for the impartiality of the legal system, as well as the capability of

³⁹ Descriptions and sources for all variables are provided in Table A I. 2.

⁴⁰ A value of one is added in both statistics to include zero observations.

institutions to monitor activities measuring both law objectiveness and effectiveness. It takes a value of 1 in the worst scenario, and a value of 6 in the best one.⁴¹ The impact of border controls, as formulated in Hypothesis 2b, is tested with two dummy variables addressing visa requirements together with a continuous variable considering the recognition rate of asylum seekers. In the first case, a dummy takes a value of 0 if citizens of source country j need a visa to enter host country i , regardless of the purpose or length of stay, for a given year t , and a value of 1 if such a document is not required to enter the host country for short visits.⁴² The second dummy takes a value of 1 if, in addition, citizens of source country j are allowed to permanently remain in the host country i without having a visa. Values taken by these two dummies are based on specific clauses of EU council regulations, Irish immigration acts, and UK immigration acts.⁴³ The recognition rates are taken from the UNHCR Refugee Statistics (UNHCR, 2009) and are calculated as the number of asylum applications approved in host country i for asylum seekers from source country j , for a given year t , divided by the total number of decisions taken (approvals, rejections and closed cases) in the host country.

Legislation on prostitution in host countries is addressed with two dummy variables that test for Hypothesis 2c. Similar to Cho et al. (2013) and Di Nicola et al. (2005), one dummy takes a value of 0 if the exchange of money for any type of sexual services is prohibited in host country i , and a value of 1 if prostitution activities are legalized in the same country. The other dummy takes a value of 1 if there is further prohibitive regulation in host country i for a given year t .⁴⁴ Thus the first dummy tests the influence of legal

⁴¹ As host countries are part of the Organisation for Economic Co-operation and Development (OECD), one could expect a fairly similar level among them in the effectiveness of their legal systems. However, we observe that in our sample of host countries the law and order index takes a minimum value of 3 and a maximum value of 6, with a mean of 5.28 and a standard deviation of 0.74. This is an indication of sufficient variation.

⁴² A short term visit cannot exceed three months according to the Council of the European Union.

⁴³ Council Regulation (EC) 574/1999 of March 12th 1999; Council Regulation (EC) 539/2001 of March 15th 2001; Council Regulation (EC) 2414/2001 of December 7th 2001; Council Regulation (EC) 453/2003 of March 6th 2003; Council Regulation (EC) 851/2005 of June 2nd 2005; Council Regulation (EC) 1791/2006 November 20th 2006; Council Regulation (EC) 1932/2006 of December 21st 2006; Council Regulation (EC) 1244/2009 of November 30th 2009; Irish Immigration Act of 2004 (No. 2) Order 2006; United Kingdom Borders Act of 2007; United Kingdom Borders, Citizenship and Immigration Act of 2009.

⁴⁴ Further regulation includes allowing the operation of brothels and solicitation of sexual services.

prostitution per se whereas the second dummy looks at the effect of further regulation.⁴⁵ This hypothesis can only be tested in specification Eq. (I.2) because, for the most part, the law remains constant over time, and they are therefore perfectly collinear with the host country fixed-effects. The same is true for our social trust variable. As suggested by the literature, we take the social trust measure from the World Value Survey 2010,⁴⁶ which has become the standard in economic research. It accounts for the percentage of the population in the survey that answer “yes” to the question “In general, do you think most people can be trusted?” Bergh and Bjørnskov (2013) show this variable to be correlated with other measures of trust such as honesty and also to be stable over time for most countries. We use this variable in model specification Eq. (I.2) to test the relationship between social trust and human trafficking expected from Hypothesis 2d.

In order to test Hypothesis 3, we include the intentional homicide rates in source country j and host country i to account for the prevalence of criminal activity. Data are taken from the Crime Trend Survey of the UNODC (UNODC, 2009b). The statistic on intentional homicides captures a wide range of acts, including domestic disputes that end in a killing, interpersonal violence, and violent conflicts over land resources, inter-gang violence over control of territory, and predatory violence and killing by armed groups, and excludes deaths arising from armed conflict. Even though the line between large-scale criminal violence and low level armed conflict is sometimes blurred, the international homicide rate is the best measure we are aware of for distinguishing criminal activity from social unrest. It acts as a proxy for the incidence of criminal activities and should ignore violence emerging from civil wars. And finally, we test Hypothesis 4 using the women’s political rights index from the Cingranelli-Richards Human Rights Dataset (CIRI, Cingranelli and Richards, 2006). The indicator covers the right to vote, the right to run for political office, the right to hold

⁴⁵ National laws define the values taken by these two dummies. Articles 104 to 106 and 214 to 217 of the Austrian Criminal Code; articles 136 and 379 to 380 of the Belgian Criminal Code; article 204 of the Czech Republic Penal Code; articles 228 to 233 of the Danish Penal Code; Article 349 of the Greek Criminal Code; Irish Criminal Law (Trafficking in Persons and Sexual Offenses) Bill of 2006; article 273 of the Dutch Criminal Code; articles 203 to 205 of the Polish Penal Code; articles 169 to 170 of the Portuguese Penal Code; articles 187 to 189 of the Spanish Penal Code; chapter 6 of the Swedish Penal Code; article 195 of the Swiss Criminal Code; United Kingdom Sexual Offenses Act of 2003.

⁴⁶ The social trust measure has been taken from Bergh and Bjørnskov (2013) who construct a measure that is the average of all available observations per country.

elected and appointed government positions, the right to join political parties, and the right to petition government officials. We take these rights as indicative of personal freedoms of women. These rights are the most fundamental guarantee of equal opportunities for women in a society. The index addresses the limitation of women's options and decisions coming from a restriction in their participation in the political process rather than those coming solely from economic disadvantages.⁴⁷ A value of 0 indicates the worst scenario, i.e., little or no women's rights, and a value of 3 indicates the best-case scenario. The index is introduced in the data analysis with dummy variables. Given that the index is never equal to zero in our time frame, only two dummy variables are needed for the regressions. One dummy takes a value of 0 if the index is equal to 1, and a value of 1 if the index is equal to 2. The other dummy takes a value of 1 if the index is equal to 3, and 0 otherwise.

Matrix Q in specification Eq. (I.2) contains three dummy variables controlling for the data quality dimensions described above. The first dummy takes a value of 0 if the TIP report in host country i is based on information provided by a public agency and a value of 1 if it is provided by a service center. The second dummy takes a value of 0 if the TIP report only includes cases of sexual exploitation and a value of 1 if it also considers other types of exploitation. The third dummy takes a value of 0 if the TIP report counts confirmed victims, and a value of 1 if it takes suspected victims into account. Summary statistics of the explanatory variables are shown in appendix Table A I. 1. Table A I. 4 lists and describes the explanatory variables and provides an overview of the sources.

I. 5 RESULTS AND DISCUSSION

This section presents results for the hypotheses developed in Section I. 3. Estimates refer to the number of victims identified by the authorities; they have been interpreted carefully with the acknowledgement that they do not completely capture the entire victim population. However, the estimation strategy allows us to provide valuable insights into the drivers of the phenomenon. Results suggest that TIP data collection by official institutions in Europe is

⁴⁷ Economic disadvantages of women are expected to influence human trafficking as well. However, we expect that the other variables in model specification Eqs. (I. 1) and (I. 2), such as income level differences between host and source countries, capture this effect.

comparable across countries and time and its examination helps to increase the understanding of human trafficking.

I. 5.1 General findings

In Tables I. 3 and I. 4 results for model specification Eqs. (I. 1) and (I. 2) are presented, respectively. We display marginal effects with robust p-values in brackets indicating levels of significance. The alpha coefficient at the bottom of the table is the dispersion parameter.⁴⁸

Hypotheses 1a, 1b and 1c predict that trafficking flows between country pairs increase with income disparity and population sizes while they decrease with geographical distance, respectively. Results confirm that this is indeed the case. As can be seen in columns 1 to 7 in Table I. 3 and columns 1 to 9 in Table I. 4, the average marginal effects (AMEs) for all three basic variables have the expected signs in both model specification Eqs. (I. 1) and (I. 2), however, the magnitudes and levels of significance are higher in model specification Eq. (I. 2) for the income disparity and population size variables. Given that our data sample covers a short period of time, the effect of income disparity and population size is most likely captured by the host country fixed-effects in model specification Eq. (I. 1).

⁴⁸ This parameter must be different from zero in order to validate the assumption of over-dispersion of the data, therefore also testing whether the zinb model is appropriate. If alpha is not equal to zero, a negative binomial model is a more appropriate specification than a Poisson-type model. Clearly this is the case in our data set.

Table I. 3: TIP victim flows, 1998-2009 (unbalanced panel)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(log) GDP pc differences	0.372 [0.164]	1.208*** [0.000]	0.544* [0.061]	0.405 [0.281]	1.058 [0.169]	0.842 [0.236]	0.727** [0.019]
(log) Population sum	1.173 [0.329]	0.783 [0.589]	0.112 [0.927]	1.925 [0.314]	0.651 [0.857]	-0.854 [0.822]	-0.735 [0.594]
(log) Distance	-1.788*** [0.000]	-0.974** [0.007]	-1.688*** [0.000]	-2.509*** [0.000]	-4.438*** [0.000]	-2.351** [0.017]	-1.193*** [0.000]
(log) Foreign population		0.393*** [0.000]					
(log) Refugees			0.276*** [0.000]				
Law and order (host)				-1.297*** [0.000]	-2.603*** [0.000]		
Law and order (source)				-0.276 [0.177]	-0.060 [0.877]		
Visa dummy 1				1.884*** [0.001]			
Visa dummy 2				0.057 [0.876]			
Asylum recognition rate					0.691 [0.367]		
Homicide rate (host)						-0.667 [0.183]	
Homicide rate (source)						-0.037 [0.487]	
Women's Index 2 (source)							0.225 [0.188]
Women's Index 3 (source)							0.113 [0.663]
Alpha parameter (over dispersion)	0.789*** [0.000]	0.625*** [0.000]	0.749*** [0.000]	0.721*** [0.000]	0.706*** [0.000]	0.460*** [0.001]	0.749*** [0.000]
Observations	11,076	8,060	11,023	7,962	4,235	3,489	9,585
Host FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is the bilateral TIP victim flows to 13 countries in Europe. Estimation method is a zero inflated negative binomial (zinb) including host country, source country and time fixed-effects. Reported values are average marginal effects, robust p-values in brackets; *, **, *** significant at 10%, 5%, and 1% levels respectively. The whole sample, without restriction of observations is used (full sample).

These initial findings are also in line with Akee, Basu, Chau and Khamis (2010) and Akee et al. (2014). The results for income inequality between host and source countries reflect push and pull factors of international movements of people, as individuals are more inclined to migrate when the gap between income at home and potential income abroad is high. It also reveals traffickers' preferences towards operation locations. Higher incomes in host countries make it more attractive for traffickers to exploit victims in these locations due to higher profit expectations, while higher income in source countries makes it more difficult for traffickers to find potential victims, given the associated smaller number of vulnerable

people. Findings for geographical distance show that individuals migrate to higher income countries that are geographically closer. In addition, they also suggest that traffickers recruit victims who are as close as possible to the chosen target location in order to reduce transportation costs. Clandestine transport of victims is costly, and the profits from trafficking decrease with increasing distances.

The variables accounting for migrant and refugee flows are included in columns 2 and 3 respectively of both Tables I. 3 and I. 4. The positive influence of both variables on human trafficking flows, as predicted in Hypothesis 1d, is corroborated. As can be seen, the marginal effects are positive and significant in both cases, at the 1 percent level, in both model specification Eqs. (I. 1) and (I. 2). These results imply that well-established migratory and refugee routes within a host-source country pair have a positive effect on the number of people trafficked between that pair. The magnitude of the effect is slightly larger for migrants than for refugees. Specifically, a threefold increase in the stock of migrants originating from a given source country and residing in a given host country, translates into one additional TIP victim being reported within the same country pair. A fourfold increase in the stock of refugees produces the same outcome. These findings suggest that trafficking mafias have a better chance of finding potential victims when there is a considerable population willing to relocate. This indicates a systematic pattern between migrant and refugee flows, and victimization, supporting the concept that these are important vulnerable population pools for human trafficking. For this reason, mafia operations involving human trafficking are most likely to be located at both ends of well-established migratory and refugee routes.

Institutional quality and regulation factors in host and source countries are included in columns 4 and 5 in Table I. 3 and in columns 4 to 6 in Table I. 4. These are expected to impact the flow of victims negatively, as stated in Hypothesis 2a. Results indicate that the quality of the legal system in host countries seems to have a systematic influence on human trafficking flows. In both model specifications Eqs. (I. 1) and (I. 2), the law and order variable in host countries is negative and statistically significant, at the 1 percent level. Although it is negative for source countries, it fails to be significant at conventional levels indicating that it has no influence on the intensity of the human trafficking flow from that country. The

results suggest that sound institutions are a deterrent for trafficking operations. As expected, traffickers prefer to locate their activities in countries where they are less likely to be prosecuted and can keep their operations hidden. This appears to have no impact on the process of recruiting victims in source countries. It is quite possible that human trafficking is difficult to detect when deceiving job offers are at the heart of the decision to migrate, or when human trafficking does not involve the transport of persons (when borders are open, for example). Victims usually only come to the realization that they have been trafficked after they have reached their destination, making it even more difficult for source country authorities to identify them as victims. Therefore, trafficking mafias do not necessarily need a poor institutional environment during the recruitment process; this is only a factor in their other exploitative activities.

The effect of border control for migrants and refugees on trafficking flows is a priori ambiguous, as predicted by Hypothesis 2b. Results are presented in columns 4 and 5 of Tables I. 5 and I. 6. Column 4 reports the impact of entrance regulations for migrants with two dummies. The first visa dummy identifies the change in the likelihood of being trafficked if visa requirements are lifted for short-term stays, while the second dummy indicates whether this change prevails for long-term stays. The marginal effect of the first dummy is positive and significant at the 1 percent level, whereas the second dummy has no significant effect in either model specification Eqs. (I. 1) or (I. 2).

Table I. 4: TIP victim flows, 1998-2009 (unbalanced panel)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(log) GDP pc differences	1.761** [0.000]	1.677** [0.000]	1.523** [0.000]	2.753** [0.000]	4.327** [0.000]	2.697** [0.000]	1.971** [0.029]	1.686** [0.000]	2.007** [0.000]
(log) Population sum	1.200** [0.000]	1.061** [0.000]	1.129** [0.000]	1.353** [0.000]	2.886** [0.000]	1.486** [0.000]	1.434** [0.029]	1.023** [0.000]	1.116** [0.000]
(log) Distance	-1.803** [0.000]	-0.731** [0.025]	-1.730** [0.000]	-2.390** [0.000]	-4.396** [0.000]	-2.483** [0.000]	-2.241** [0.029]	-1.760** [0.000]	-1.563** [0.007]
(log) Foreign population		0.395** [0.000]							
(log) Refugees			0.226** [0.000]						
Law and order (host)				-0.684** [0.000]	-1.069** [0.004]	-0.356 [0.135]			
Law and order (source)				-0.219 [0.335]	-0.071 [0.867]	-0.260 [0.273]			
Visa dummy 1				2.545** [0.001]					
Visa dummy 2				-0.125 [0.719]					
Asylum recognition rate					0.989 [0.204]				
Prostitution legal (host)						0.994 [0.122]			
Prostitution regulation (host)						0.449 [0.147]			
Social trust (host)							-0.029** [0.034]		
Social trust (source)							-1.851 [0.549]		
Homicide rate (host)								0.229 [0.256]	
Homicide rate (source)								0.090 [0.756]	
Women's Index 2 (source)									-0.274 [0.201]
Women's Index 3 (source)									-0.073 [0.235]
Institution type	-1.271** [0.000]	-1.285** [0.000]	-1.219** [0.001]	-0.857** [0.025]	-2.364** [0.009]	-0.557 [0.183]	-1.160** [0.009]	-1.290** [0.001]	-1.420** [0.027]
Exploitation type	1.256** [0.000]	1.602** [0.000]	1.427** [0.000]	1.181** [0.003]	2.823** [0.003]	0.526 [0.242]	0.898** [0.016]	1.350** [0.001]	1.670** [0.019]
Confirmed victims	1.457** [0.000]	0.695** [0.002]	1.214** [0.000]	2.609** [0.000]	4.424** [0.000]	2.346** [0.000]	2.187** [0.000]	1.405** [0.000]	1.154* [0.055]
Alpha parameter (over dispersion)	0.913** [0.000]	0.762** [0.000]	0.886** [0.000]	0.883** [0.000]	0.683** [0.000]	0.889** [0.000]	0.887** [0.000]	0.622 [0.159]	0.905** [0.000]
Observations	11,076	8,060	11,023	7,962	4,235	7,962	7,925	3,489	9,585
Host FE	No	No	No	No	No	No	No	No	No
Source FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is the bilateral TIP victim flow to 13 countries in Europe. Estimation of the full sample by zero inflated negative binomial (zinb) including source country and time fixed-effects, and data quality controls. Reported values are average marginal effects, robust p-values in brackets; *, **, *** significant at 10%, 5%, and 1% levels respectively.

This shows that, even after institutional quality is held constant, better trafficking opportunities exist when potential victims are not required to obtain an entry permit for short-term stays. Within country pairs with such visa policies, there are, on average, two more victims when compared to other country pairs with different entry requirements. The scope for trafficking vanishes, however, when third country nationals are allowed to stay permanently. From these results, we observe that trafficking mafias in Europe do not tend to

operate through assisting illegal migration, but rather through the provision of deceptive job opportunities. Borders are open for a large proportion of potential victims and the room for victim exploitation disappears when residence is not constrained. Likewise, the impact of entrance regulations for refugees is tested by the asylum recognition rate in column 5. The marginal effects of this variable fail to be significant at conventional levels in both, suggesting that human trafficking is not affected by border controls for refugees after considering the influence of legal system quality. Therefore, such restrictions do not affect the chances of refugees being victimized, but rather it is the institutional quality within the host country that exposes the refugee population to more exploitative situations.

Contrary to our expectations from Hypothesis 2c, the empirical analysis suggests that legislation of prostitution activities in host countries has no systematic influence on victim numbers, as shown in column 6 of Table I.4. Please note that the two dummy variables addressing legislation on prostitution are only introduced in model specification Eq. (I.2), due to low variability over time. The first dummy captures the additional effect of legalizing the commerce of sexual services in host countries after controlling for institutional quality, while the second dummy captures the additional effect of further regulation of the market for prostitution. The marginal effects of both dummies turn out to be insignificant at conventional levels, implying similar trafficking opportunities regardless of the legal status and regulation of commercial sexual activities in host countries. Legislation of prostitution activities seems to play a minor role in creating incentives for human trafficking, in contrast to deficiencies in legal systems. These results are in contrast to the findings of Cho et al. (2014) and Jacobson and Kotsadam (2013). Exploitation and/or coercion into the prostitution market are a consequence of poor institutional quality to monitor these activities, rather than specific legislation in this segment. Results might also respond to the growing importance of other non-sexual forms of exploitation in TIP inflow patterns.⁴⁹

⁴⁹ For example, according to the Dutch Foundation against Trafficking in Women (STV Comensha), segments other than sexual exploitation accounted for 51 percent of all human trafficking cases in the Netherlands in 2009. The same figures are 55 percent for the United Kingdom in 2009, and 69 percent for Belgium in 2010 - according to the United Kingdom Human Trafficking Centre (UKHTC) and the Belgium National Immigration Department, respectively.

We also find that generalized trust effects matter in host countries but not in source countries, as shown in column 7 of Table I.4. In host countries, social trust is associated with less intense TIP flows, which is in line with our expectations in Hypothesis 2d. The larger the population that thinks most people can be trusted in a society the fewer the exploitation opportunities for traffickers in host countries. Social trust leads to a sound institutional environment, hindering traffickers' efforts to find loopholes for exploitative placements. We do not find any systematic relationship of trust levels in source countries suggesting no influence on recruitment operations.

Turning to Hypothesis 3 we find no effect of crime levels on human trafficking flows. The marginal effect in column 6 of Table I.3, and column 8 in Table I.4 is probably a consequence of the sample size induced by the low availability of this variable. The Crime Trend Survey of the UNODC is still the most comprehensive compilation of crime statistics we are aware of, but the number of observations drops sharply, to almost a third of the size of other specifications, when the homicide rate is included in the regression. Thus, results obtained here are based on incomplete information.⁵⁰

The Empirical results do not suggest a gender dimension in the intensity of victim flows as suggested by Hypothesis 4. Column 7 in Table I.3 and column 9 in Table I.4 report the results. Women's political rights in source countries do not show a non-linear relationship. The marginal effects of both dummy variables are not significant, although the p-value of the first dummy is considerably lower than that of the second dummy. We find no support for the argument that the level of political rights for women in source countries has an impact on recruitment opportunities, although the signs of the coefficients and size of the respective p-values point to a possible inverted U-shape relationship.

Finally, we turn to the reporting quality controls, included only in model specification Eq. (I.2) – reported in Table I.4 – that ensure data comparability across countries in a framework without host country fixed-effects. With the exception of model 6, all three variables are significant at conventional levels. The negative sign for the institution type variable indicates that public agencies tend to report fewer victims than do service centers.

⁵⁰ Subsection I. 5.2 shows that insignificant results for homicide rates are very likely to be driven by the quality of the data sample.

This outcome might reflect the fact that victims are often hesitant to contact or work together with the police, as they fear deportation or punishment (Tyldum and Brunovskis, 2005). In addition, institutes report significantly larger victim numbers when their statistics include victims of all kinds of exploitation, rather than only sexual exploitation, and also if they count suspected victims, rather than confirmed victims. These results suggest that reporting characteristics of institutions producing TIP statistics require special attention, as their inclusion in the empirical analysis has a systematic influence. Our main findings are therefore based on the fixed-effects setting where we control for all potential unobserved time invariant factors inducing TIP flows.

I. 5.2 Robustness checks

We use numerous approaches to check the robustness of the results. First, as the sample size changes substantially from one regression to another, we perform the analysis with different sample sizes but hold the number of observations equal across all regressions. We then check if coefficient signs, sizes and significance levels remain similar, regardless of sample size. We construct three sample sizes, excluding observations with missing values for the law and order index variable, then for the asylum recognition rate variable, and finally for the homicide rate variable, respectively. Here, we show regression results for the first case only.⁵¹ Tables I.5 and I.6 present the analysis outcome when we exclude observations with missing values for the law and order index and for our two model specifications, respectively.

⁵¹ Results excluding observations with missing values for the asylum recognition rate and homicide rate variables are available upon request.

Table I. 5: TIP victim flows, reduced sample, 1998-2009 (unbalanced panel)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(log) GDP pc differences	0.538 [0.137]	1.682*** [0.000]	0.683 [0.107]	0.405 [0.281]	1.058 [0.169]	0.860 [0.270]	0.925** [0.035]
(log) Population sum	1.593 [0.392]	0.653 [0.747]	-0.484 [0.794]	1.925 [0.314]	0.651 [0.857]	-1.245 [0.782]	-1.112 [0.597]
(log) Distance	-2.278*** [0.000]	-1.178*** [0.008]	-2.320*** [0.000]	-2.509*** [0.000]	-4.438*** [0.000]	-2.569*** [0.000]	-2.184*** [0.000]
(log) Foreign population		0.532*** [0.000]					
(log) Refugees			0.400*** [0.000]				
Law and order (host)				-1.297*** [0.000]	-2.603*** [0.000]		
Law and order (source)				-0.276 [0.177]	-0.060 [0.877]		
Visa dummy 1				1.884*** [0.001]			
Visa dummy 2				0.057 [0.876]			
Asylum recognition rate					0.691 [0.367]		
Homicide rate (host)						-0.758 [0.127]	
Homicide rate (source)						-0.036 [0.520]	
Women's Index 2 (source)							0.333 [0.190]
Women's Index 3 (source)							0.081 [0.829]
Alpha parameter (overdispersion)	0.922*** [0.000]	0.741*** [0.000]	0.903*** [0.000]	0.969*** [0.000]	0.706*** [0.000]	0.632*** [0.000]	0.870*** [0.000]
Observations	7,962	5,940	7,935	7,962	4,235	3,226	7,138
Host FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is the bilateral TIP victim flows to 13 countries in Europe. Estimation by zero inflated negative binomial (zinb) including host country, source country and time fixed-effects. Reported values are average marginal effects, robust p-values in brackets; *, **, *** significant at 10%, 5%, 1%. Sample size reduced in order to match availability of host country law and order variable.

The results remain similar in direction and magnitude, at similar levels of significance. Likewise, when we exclude observations with missing values for the asylum recognition rate variable, results do not change noticeably. It is worth noting that under this setting, as in previous specifications, the effect of border controls for refugees does not turn out to be significant at conventional levels either. Reducing the sample by excluding observations with missing values for the homicide rate variable does, however, change the picture. But for a few exceptions, the coefficients in all regressions are significant. This supports the

suggestion that the number of observations in this regression is driving the results for this variable, which is not significant at conventional levels in any of the specifications. Consequently, except for regressions including homicide rates, differences in sample size do not seem to influence regression outcomes, an indication of consistency in the determinants of TIP victim inflows into the 13 host countries.

Second, we check whether the results hold for different estimation methods. Here, we run the regressions using negative binomial and probit models, as well as an OLS model with Driscoll and Kraay (1998) standard errors, and obtain very similar results.⁵² Although Negative Binomial models do not account for the excess zeros in the dependent variable, unlike Poisson models, they do address over-dispersion. The results from the negative binomial specifications are almost identical to those from the initial zero inflated negative binomial specification. Sizes, signs and significance levels remain (almost) unaffected, adding further support to the suggestion that the results predominantly reflect interdependent behavior of the explanatory variables, and to a lesser extent model specification selection. Probit models test for the probability of the occurrence of human trafficking. We construct a binary variable which takes a value of one if at least one TIP victim is reported within a country pair, and zero otherwise. Results do not differ qualitatively from base results. The three gravity variables take the expected sign and are significant at conventional levels. All other results are also supported. The OLS estimator with Driscoll-Kraay standard errors assumes heteroskedasticity, time trend as well as correlation between groups (country pairs) is used. The coefficients resemble those in Tables I.5 and I.6 in terms of sign and statistical significance. We conclude that our results are robust to the assumption of contemporaneous dependence between country-pairs as well.

⁵² Results for the negative binomial, probit and OLS with Driscoll-Kraay standard errors specifications as well as for the exclusion of Greece are available upon request.

Table I. 6: TIP flows, reduced sample, 1998-2009 (unbalanced panel)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(log) GDP pc differences	2.553*** [0.000]	2.468*** [0.000]	2.244*** [0.000]	2.753*** [0.000]	4.327*** [0.000]	2.697*** [0.000]	2.707*** [0.001]	2.146** [0.010]	2.335*** [0.000]
(log) Population sum	1.652*** [0.000]	1.467*** [0.000]	1.544*** [0.000]	1.353*** [0.000]	2.886*** [0.000]	1.486*** [0.000]	1.333*** [0.000]	1.568*** [0.007]	1.333*** [0.000]
(log) Distance	-2.462*** [0.000]	-1.026** [0.025]	-2.349*** [0.000]	-2.390*** [0.000]	-4.396*** [0.000]	-2.483*** [0.000]	-2.410*** [0.000]	-2.421** [0.013]	-2.286*** [0.000]
(log) Foreign population		0.551*** [0.000]							
(log) Refugees			0.329*** [0.001]						
Law and order (host)				-0.684*** [0.000]	-1.069*** [0.004]	-0.356 [0.135]			
Law and order (source)				-0.219 [0.335]	-0.071 [0.867]	-0.260 [0.273]			
Visa dummy 1				2.545*** [0.001]					
Visa dummy 2				-0.125 [0.719]					
Asylum recognition rate					0.989 [0.204]				
Prostitution legal (host)						0.994 [0.122]			
Prostitution regulation (host)						0.449 [0.147]			
Social trust (host)							-0.031** [0.015]		
Social trust (source)							-2.992 [0.440]		
Homicide rate (host)								-0.300 [0.180]	
Homicide rate (source)								-0.075 [0.227]	
Women's Index 2 (source)									0.250 [0.382]
Women's Index 3 (source)									-0.162 [0.700]
Institution type	-1.327*** [0.003]	-1.441*** [0.000]	-1.215*** [0.008]	-0.857** [0.025]	-2.364*** [0.009]	-0.557 [0.183]	-0.931** [0.032]	-1.492*** [0.008]	-1.233*** [0.008]
Exploitation type	1.506*** [0.001]	2.047*** [0.000]	1.755*** [0.001]	1.181*** [0.003]	2.823*** [0.003]	0.526 [0.242]	0.715* [0.078]	1.767*** [0.003]	1.561*** [0.002]
Confirmed victims	2.100*** [0.000]	0.854*** [0.007]	1.760*** [0.000]	2.609*** [0.000]	4.424*** [0.000]	2.346*** [0.000]	2.528*** [0.000]	1.299** [0.030]	1.897*** [0.000]
Alpha parameter (over dispersion)	0.980*** [0.000]	0.741*** [0.000]	0.886*** [0.000]	0.883*** [0.000]	0.683*** [0.000]	0.889*** [0.000]	0.906*** [0.000]	0.632 [0.453]	0.870*** [0.000]
Observations	7,962	5,940	7,935	7,962	4,235	7,962	6,983	3,226	7,138
Host FE	No	No	No	No	No	No	No	No	No
Source FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is the bilateral TIP victim flows to 13 countries in Europe. Estimation is a zero inflated negative binomial (zinb) including source country and time fixed-effects, and data quality controls. Reported values are average marginal effects, robust p-values in brackets; *, **, *** significant at 10%, 5%, 1%. Sample size reduced in order to match availability host country law and order variable.

Finally, given the concern that a comparison across reporting institutions might not be feasible, we exclude those observations for which a host country scored less than 10 in the 3P Anti-trafficking Policy Index. Greece in the 2003-2005 period meets this criteria. The results are not different except for the specification including the homicide rate where the number of observations drops considerably. Overall, we do not observe a fundamental change of the results regardless of the constraints we put on the data.

I. 6 CONCLUSION

Summing up, this study is the first to quantitatively analyze the determinants of human trafficking by employing officially recorded victim flows. This is a new addition to the literature and improves upon previous work on the topic, as these had only measured human trafficking incidence, a common proxy in empirical analysis, rather than intensity. To the best of our knowledge, there are no other studies employing TIP victim numbers in order to identify its drivers.

Results show that the frequency of human trafficking between country pairs increases with cross-country income disparity and decreasing geographical distance from each other. Trafficking organizations prefer to recruit victims in lower income countries, where the size of the vulnerable population is larger, and exploit them in higher income countries, where profits are higher. Recruitment and exploitation activities are more likely to be located between geographically closer countries presumably due to lower logistical and victim transportation costs. Furthermore, human trafficking appears to occur more often along well-established migratory and refugee routes, as the chance of finding potential victims increases when there is a considerable population willing to relocate and the set-up costs for illegal infrastructure (in the form of contacts, known drop-off points and inroads etc.) are already paid.

From our findings it can be seen that good institutional quality hinders exploitation opportunities in host countries, but does not reduce recruitment operations in source countries. In addition, human trafficking seems to be more likely to occur between country pairs where citizens from the source country are not required to acquire a travelling document to enter the host country. Trafficking incentives disappear, however, when those same citizens are allowed to stay in the host country without constraints. These results

indicate the way traffickers operate in Europe. It seems to be the case that victims are more likely to be contacted through the offering of deceptive job opportunities rather than smuggling services. A large proportion of the victims (41 percent in our dataset) are not required to acquire a permit to enter the host countries in our analysis, and possibly only come to realize that they have been trafficked upon reaching their destination. This suggests that authorities face challenges in identifying TIP victims before they have been exploited in host countries. Host country recognition rates of asylum seekers, on the other hand, do not impact victim flows. Refugees appear not to be exposed to exploitation by trafficking mafias once they have reached a host country, whether or not they have been granted asylum. Interestingly, the legal status and regulation of commercial sex services do not impact upon exploitation opportunities in host countries. This finding suggests that sound institutional quality ensures a limited scope for exploitation and coercion in the prostitution market, regardless of the type of legislation, be it abolitionist or supporter. We also observe that higher social trust levels in host countries are associated with a lower intensity of trafficking. And lastly, the status of women's rights does not affect recruitment opportunities in source countries. Apparently, the vulnerable position of women to trafficking is better captured by their lack of economic opportunities and willingness to migrate rather than inability to participate in the political life of their home country.

Trafficking in persons is a business routed in the international movement of people and, as is the case with any other criminal activity, is driven by large profits. Even if borders are open, as in the European Union, governments from both sides must monitor and assist such movements in order to reduce trafficking opportunities. Our findings indicate that policies seeking to combat human trafficking should not focus exclusively on the implementation of optimal legislation for commercial sex services. In fact, policies should center on adopting and enforcing anti-trafficking law and strengthening the prosecution and conviction of offenders. This would lead to a more effective reduction in victim numbers in the future.

APPENDIX I

Table A I.1: Summary statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
(log) GDP pc diff	11558	2.18	1.71	-2.8	6.16
(log) Population sum	12770	31.58	2.35	25.19	38.94
(log) Distance (km)	12028	8.468	0.84	5.08	9.88
(log) Foreign population	8697	4.98	2.91	0	13.04
(log) Refugees	12782	1.39	2.12	0	10.88
Law and order (host)	12852	5.27	0.74	3	6
Law and order (source)	8477	3.75	1.33	0.5	6
Prostitution dummy 1 (host)	12882	0.87	0.33	0	1
Prostitution dummy 2 (host)	12978	0.4	0.49	0	1
Asylum recognition rate	5604	0.14	0.22	0	1
Visa dummy 1	12978	0.31	0.46	0	1
Visa dummy 2	12978	0.1	0.31	0	1
Homicide rate (host)	10148	1.14	0.62	0	2.6
Homicide rate (source)	4038	4.6	8.07	0	90.76
Women's Index 2 (source)	10086	0.72	0.44	0	1
Women's Index 3 (source)	10086	0.12	0.33	0	1
Trust (all waves) host	12976	40.15	15.39	19.31	68.08
Trust (all waves) source	8246	24.57	13.34	3.51	68.08
Dummy Institution type	12872	0.82	0.38	0	1
Dummy Exploitation type	12858	0.67	0.46	0	1
Dummy Confirmed victims	12850	0.8	0.39	0	1

Notes: Summary statistics include number of observations (Obs.), mean, standard deviation (Std. Dev.), minimum (Min.) and maximum (Max.) of the respective variable.

Table A I.2: Data description and sources

Variable	Description	Source	Years
Victim flow	TIP victims in host country from source country	TIP reports. Refer to Table 1.	1998-2009
(log) GDP per capita differences	GDP per capita in current US dollars ratio between host and source country.	World Bank Development Indicators (WDI) database.	1998-2009
(log) Population sum	Total population sum of host and source country.	World Bank Development Indicators (WDI) database.	1998-2009
(log) Distance	Geographical distance between host and source country's largest cities in terms of population share.	Institute for Research on the International Economy (CEPII).	1998-2009
(log) Foreign population	Stock of permanent migrants in host country from source country.	European Union Statistical Office (EUROSTAT).	2001-2009
(log) Refugees	Number of refugees in host country from source country.	UN Refugee Agency (UNHCR)	1998-2009
Law and order (host) Law and order (source)	Law and order index. From 0 (worst) to 6 (best).	International Country Risk Guide (ICRG).	1998-2009
Prostitution dummy 1 (host)	Legal status of prostitution dummy in host country. 0 (not legal), 1 (legal).	Self-construction, based on national legislation. Refer to page 18.	1998-2009
Prostitution dummy 2 (host)	Regulation status of prostitution dummy in host country: 0 (not regulated), 1 (regulated).	Self-construction, based on national legislation. Refer to page 18.	1998-2009
Visa dummy 1	Short term visa requirement dummy in host country for citizen from source country: 0 (required), 1 (not required).	Self-construction, based on multilateral and national legislation. Refer to page 19.	1999-2009
Visa dummy 2	Long term visa requirement dummy in host country for citizens from source country: 0 (required), 1 (not required).	Self-construction, based on multilateral and national legislation. Refer to page 19.	1999-2009
(log) Asylum recognition rate	Number of recognitions out of total decisions in host country for asylum seekers from source country.	UN Refugee Agency (UNHCR)	1998-2009
Homicide rate (host) Homicide rate (source)	Homicides per 100,000 people	UN Surveys on Crime Trends and the Operations of Criminal Justice Systems (UNODC-CTS).	2000-2008
Social trust (host) Social trust (source)	Percentage of a population that answers yes to the question "In general, do you think most people can be trusted?" Average over all observations.	World Value Survey (2010), provided by Bergh and Bjørnskov (2013)	2000-2010
Women's index 2	Women's political rights index dummy: 0 (index different to 2), 1 (index equals 2).	Cingranelli- Richards (CIRI) Human Rights Dataset.	1998-2008
Women's index 3	Women's political rights index dummy: 0 index different to 3), 1 index equals 3).	Cingranelli- Richards (CIRI) Human Rights Dataset.	1998-2008
Institution type	Data quality control for type of institution: 0 (service center), 1 (public agency).	Self-constructed, based on TIP reports. Refer to Table 1	1998-2009
Exploitation type	Data quality control for types of exploitation accounted for: 0 (only sexual exploitation), 1 (other types in addition).	Self-constructed, based on TIP reports. Refer to Table 1	1998-2009
Confirmed victims	Data quality control for counting victim method: 0 (confirmed), 1 (suspected).	Self-constructed, based on TIP reports. Refer to Table 1	1998-2009

Table A I. 3: Literature review and hypotheses

Hypotheses	Paper	Content	Data
	Harris and Todardo (1970)	Theoretical paper that models the determinants of migration flows between urban and rural areas with permanent wage differences as the main driver.	
	Rotte and Vogler (1998)	Empirical paper that confirms economic differentials between countries, the political environment in sending countries and the role of networks as important factors for migration to Germany. It also recognizes an inverse U-shaped relationship between development and migration.	Migrants and refugees inflows, German Federal Ministry of Interior, 1984-1995
<i>H1a</i>	De Giorgi and Pellizzari (2009)	Empirical analysis of welfare migration across the countries of the European Union prior to the enlargement. Impact of welfare generosity on migration decisions is small but significant.	Migration and citizenship, European Community Household Panel, 1994-2001. Benefit entitlements and replacement rates, OECD, 1970-1995.
	Jean and Jimenez (2011)	Empirical analysis for OECD countries about the consequences of immigration on natives' unemployment rates.	Migrants and unemployment rate, OECD and European Labor Force Survey, 1984-2003.
<i>H1b</i>	ILO (2003)	Report on the perspectives on migration taking into account market pressures and migrant exploitation.	
	Greenwood (1975)	Literature survey on the determinants of migration to the US. Distance is observed to be an important factor explaining the distribution of migration.	
<i>H1c</i>	Jac-Kucharski (2012)	Empirical analysis of the determinants of human trafficking to the US. Reduced trafficking costs increases the pool of victims, among other findings.	Number of people granted T-visas, US State Department, 2003-2008. Migrants, US Census, 2000. Visa requirements, DOC BCA, 1990
	Mahmoud and Trebesch (2010)	Empirical analysis of Eastern European countries showing that trafficking occurs in regions with large emigration flows. Illegal migration and asymmetric information serve as additional triggers.	Incidence of human trafficking, ILO Household Survey in Belarus, Bulgaria, Moldova, Rumania and Ukraine, 2006.
<i>H1d</i>	Akee et al. (2010c)	Empirical analysis on the relationship between migration and trafficking in ethnically fragmented and conflict prone countries. Internally displaced persons are more vulnerable to be trafficked.	Incidence of human trafficking, US State Department, 2003. Number of displaced persons, UNHCR, 1993-2001. Ethnic fractionalization, Alesina et al., 2003.

Table A I.3: Literature review and hypotheses (continued)

<i>H2a</i>	Friedman et al. (2000)	In an empirical analysis for 69 countries, the authors find that higher tax rates are associated with less unofficial activity while corruption with more unofficial activity. Entrepreneurs go underground not to avoid official taxes but to reduce the burden of bureaucracy and corruption.	Unofficial economy, Loayza, 1996; Johnson et al., 1997; Schneider and Enste, 1998.
<i>H2b</i>	Gathmann (2008)	Empirical analysis about the effect of legal border enforcement on illegal migration. Demand for smugglers is found to be high, while the effect of enforcement on illegal migration is moderate but significant.	Illegal migration, Mexican Migration Project Survey, 2005. Enforcement records, US Department of Homeland Security, 1976-2004. Punishment records, Federal Judicial Center, 1970-2004.
Akee et al. (2010a)	Theoretical model on the determinants of trafficking in women and children across countries. Stricter border controls decrease overall immigration but increase debt financed migration.	Mahmoud and Trebesch (2010)	Incidence of human trafficking, ILO Household Survey in Belarus, Bulgaria, Moldova, Rumania and Ukraine, 2006.
<i>H2c</i>	Di Tommaso et al. (2009)	Theoretical and empirical work on the well-being of sexually exploited women. Well-being is worse off the more secluded the places for sex workers and trafficked women are.	Trafficked women, IOM Counter Trafficking Module, 2000.
Akee et al. (2010b)	Theoretical and empirical analysis of transnational trafficking, law enforcement and victim protection. Positive impact on trafficking from anti-prostitution legislation in host and source countries. Evidence consistent with the mutual reinforcement perspective.	Jacobson and Kotsadam (2010)	Incidence of human trafficking, US State Department, 2003. Legislation on prostitution, Protection Project, 2002.
Cho et al. (2013)	Empirical analysis on the relationship between legislation on prostitution and human trafficking based on cross-section analysis for 140 countries. Countries in which prostitution is legal report larger human trafficking inflows.	Intensity of human trafficking, UNODC, 1996-2003; ILO, 1994-2005. Legislation on prostitution, Bureau of Democracy, Human Rights and Labor, 1996-2003. Intensity of human trafficking, UNODC, 2006. Legislation on Prostitution, Outshoorn, 2004.	

Table A I.3: Literature review and hypotheses (continued)

	Bjørnskov (2011)	Empirical analysis on the relationship between social trust and corruption. Formal institutions are more effective in combating corruption in countries with high levels of social trust.	Index of corruption, Dreher et al., 2007. Social trust, World Value Survey, 2010.
<i>H2d</i>	D'Hernoncourt and Méon (2012)	Empirical investigation on the relation between the informal economy and social trust. Negative impact in both developed and developing countries. Effect is robust to a variety of tests.	Unofficial economy, Schneider, 2005a; 2005b; 2007. Social trust, World Value Survey, 2010. Taxation, Fraser Institute, 1994-2003. Property rights, Heritage Foundation, 1994-2003. Perception of corruption, Transparency International, 1994-2002
	Salt and Stein (1997)	Based on empirical evidence a theoretical model is developed in which trafficking serves as an intermediary system between origin and destination countries. It consists of three stages: mobilization, en route, and insertion and integration.	
	Brucker and Parent (2000)	Literature review on the link between trafficking and organized crime. It highlights that criminal organizations adapt easily to changing environments.	
<i>H3</i>	Salt (2000)	Literature review on the link between conventional organized crime and a range of activities with an entrepreneurial character and carried out in the market economy.	
	Stoecker (2000)	Qualitative research on the rise in human trafficking and the role of organized crime. Good organized criminal organizations with logistical networks are necessary to attract and transport women to their exploitation destination.	
	United Nations (2006)	World Survey on the role of women in development highlighting the possible relationship between women's rights and exploitation.	
	Cho (2013)	Empirical work on globalization, women's rights, son preference and human trafficking. Economic globalization positively affects women's economic and social rights, but does not affect the number of trafficked women.	KOF Globalization Index, Dreher et al., 2006. Gender Development Indicator, UNDP, 1981-2008. Women's rights, CIRI, 1981-2008. Social institutions and gender, Branisa, Klases and Ziegler, 2009.
<i>H4</i>	Cooray and Potrafke (2012)	Empirical analysis of gender inequality in education. Political institutions influence the education of girls whereas gender inequality is primarily affected by education through culture and religion. Discrimination is most distinct in Muslim dominated countries.	School enrollment ratio, World Bank, 2010. Official religion, Encyclopedia of World Geography, 1994; CIA World Factbook, 2010.

Table A I. 4: Overview of hypotheses and respective results

Hypotheses	Independent Variables	Expected sign	Hypotheses confirmed	Statistical significance
H1a	More intense flows of human trafficking victims are observed between country pairs that have larger income differentials.	(+)	Yes	99%
H1b	More intense flows of human trafficking victims are observed between country pairs that have larger populations.	(+)	Yes	95%
H1c	Flows between countries are larger if the countries are geographically closer to each other.	(-)	Yes	95%
H1d	Well-established routes for migrants and refugees encourage human trafficking and increase the number of victims.	(+), (+)	Yes, Yes	99%, 99%
H2a	Legal enforceability in host countries is a positive determinant of TIP flows.	(-), (-)	Yes, No	99%, N/A
H2b	Border controls, such as visa requirements and recognition of asylum seekers determine TIP flows between countries.	(?)	Yes, No, No	99%, N/A, N/A
H2c	Legislation on prostitution determines TIP flows between countries.	(?)	No, No.	N/A, N/A
H2d	Social trust is expected to reduce TIP flows in both host and source countries.	(-), (-)	Yes, No	95%, N/A
H3	Trafficking flows are more common between country pairs with higher levels of criminal activity.	(+), (+)	No, No.	N/A, N/A
H4	There is an inverted U-shaped relationship between women's rights and human trafficking.	(+), (-)	No, No.	N/A, N/A



CHAPTER II

**INTERNATIONAL HUMAN TRAFFICKING:
MEASURING CLANDESTINITY BY THE STRUCTURAL EQUATION
APPROACH**

Keywords: Human trafficking, MIMIC model, latent variable, structural equation model

JEL classification: C39; F22; K42; K49

Acknowledgment: I would like to thank Friedrich Schneider for his support in this project.

II. 1 INTRODUCTION

Since human trafficking (HT) is the third largest illicit international commerce, after illegal drug and weapon smuggling (U.S. Department of State, 2004), it creates an underground economy of illegal labor markets and businesses where immense profits and great suffering go hand in hand. Profit estimates range from 1 billion dollars (Belser, 2005) to 31.61 billion dollars (Interpol, 2012; ILO, 2005); money that is generated on tax evasion and presumably used for illegal businesses that traffic individuals as well as other associated activities. The trafficked are abused through exploitation and coercion and deprived of the freedom to move or choose their place of living (Gallagher, 2009a). Like other transnational criminal activities it is also linked with the corruption of civil as it bypasses borders, undermines state sovereignty and threatens state governance and human security (Shelley, 1999).

To render the clandestine phenomena of human trafficking visible, the objective of this chapter is to render trafficking in persons visible through suggesting a new measure of HT addressing the extent of victim exploitation in destination countries. Based on observed causes and indicators, the multiple indicators multiple causes (MIMIC) structural equation approach allows us to explore the structural relationship between the causes and indicators of HT which to the best of our knowledge has not been applied before. Research on human trafficking is confronted with the hidden nature of the population active in practice, i.e., victims and traffickers (Tyldum and Brunovskis, 2005). This makes it difficult to draw a representative sample or to get firsthand information on the circumstances involved. Additionally, the purely economic focus on either the supply side or demand side aspects does not give credit to the complexity, motivations and interaction of agents in the trafficking process (Laczko and Gozdziak, 2005). An integral approach is needed that combines all facets and dimensions. In order to capture HT as precisely as possible both aspects' indicators and causes must be included; this has been neglected in earlier studies. The main idea behind the MIMIC model is to examine the relationship between an unobservable variable, e.g., the shadow economy, corruption, human trafficking, etc. and a set of observable variables using covariance information (Buehn and Schneider, 2012). The flexibility in estimating the correlations of observable factors is one of the main advantages of the MIMIC approach.

We disentangle these relationships and derive an index of the extent of trafficking in persons in destination countries by applying this single latent variable structural equation method. This method provides a detailed analysis of HT, which sheds further light on the mechanism behind the trafficking process. The construction of an index of the scale together with the possibility to re-estimate the model on a yearly basis over the period of ten years (2000-2010) has the advantage to address the question of how HT evolves in this decade. Given that the index not only offers a ranking of countries but also the possibility to interpret the relative difference between countries, future research will be able to build on this measure and test hypotheses with empirical analysis.

To foreshadow basic results, the MIMIC estimates support the main hypotheses on the determinants and indicators of trafficking in persons; namely, richer countries see a larger extent of HT. The human trafficking intensity index shows the prevalence of human trafficking in destination countries for the 2000 to 2010 period for 142 countries. The measure is positively correlated with other relevant measures and shows to be relevant in this field of research in a simple application.

The chapter is organized as follows: The next section defines human trafficking and presents the dynamics between causes and consequences of human trafficking. Testable hypotheses are established and the data are described. Section II. 3 explains the value of using the MIMIC approach on the extent of HT and presents a baseline model. In Section II. 4 we discuss in depth the application, model fit indicators and empirical results. Thereafter, we present the HT intensity index and demonstrate its relevance. Section II. 5 concludes the chapter.

II. 2 DYNAMICS OF HUMAN TRAFFICKING: SOME THEORETICAL CONSIDERATIONS

Following chapter I of this thesis, we understand human trafficking in accordance with the international definition of trafficking in persons.⁵³ It is not only the first successful international agreement on the common elements and implications of HT, but it also

⁵³ The Definition is presented in the *Palermo Protocol* Article 3 (Protocol to Prevent, Suppress and Punish Trafficking in Persons, especially Women and Children supplement to the Convention against Transnational Organized Crime, 2000).

provides an important working basis for the present research.⁵⁴ The main elements are the incorporation of all forms of enslavement and the focus on the exploitation of victims through coercion or deception. These components acknowledge that most of HT's victims are vulnerable through migration, not willingly enslaved, and that it is a clandestine business of internationally-active criminal networks. These elements are two sides of the same coin: individuals that are vulnerable and prone to traffickers and criminal networks that make use of their circumstances. Both aspects have to be considered when measuring HT.

The focus of the analysis is on the extent of human trafficking in destination countries.⁵⁵ We identify what drives people to exploit exposed individuals, i.e. the demand structure; and what puts people in this vulnerable position, i.e. the potential supply. In economic terms, HT is located in a market setting where demand and supply are met on the shoulders of vulnerable individuals. The main reason for the abuse and exploitation of people is global income disparity. Emigration is propelled by economic factors that drive people to migrate and take risks in searching for more prosperous living conditions. In particular, traffickers use their victims' vulnerability and bring them to countries where both the demand for cheap labor and exploitation profits are high. These are the key factors that help identify the indicators and causes of HT to destination countries.

II. 2.1 Indicators of human trafficking

The extent of human trafficking is not directly measurable; therefore indicators have to be identified that are a function of HT in destination countries. The literature does not yet offer extensive guidance with respect to appropriate indicators of human trafficking.

⁵⁴ Article 3 of the protocol states that "human trafficking is the recruitment, transportation, transfer, harboring or receipt of persons, by means of the threat or use of force or other forms of coercion, of abduction, of fraud, of deception, of the abuse of power or of a position of vulnerability or of the giving or receiving of payments or benefits to achieve the consent of a person having control over another person, for the purpose of exploitation. Exploitation shall include, at a minimum, the exploitation or the prostitution of others or other forms of sexual exploitation, forced labor or services, slavery or practices similar to slavery, servitude or the removal of organs" (United Nations, 2000).

⁵⁵ Since October 2013 a measure of the prevalence of population in slavery for 162 countries is developed by the Walk Free Foundation (2013). This approach is based on risk characteristics of countries at one point in time. In contrast to the HT intensity measure provided here, the measure does not take into account development over time, which restricts analysis to the recent year rather than analysis of the last decade, and thus makes a comparison difficult.

To the best of our knowledge we are the first to determine multiple indicators to measure its extent in destination countries. Many aspects are correlated with human trafficking that could partially indicate its prevalence in a country. After extensive research of anecdotal and country evidence (see, e.g., US Department of State, 2010-2013) it becomes apparent that human trafficking has a two-sided nature. Some consequences are visible, but its illegal nature requires most of the action to be covert. Trafficking victims are exposed to life-threatening conditions such as health risk, under-nutrition and physical and psychological stress. One prime indication of HT in the country is the number of identified victims in these countries. Although it is important to be aware that identification of victims, prosecution of traffickers and prevention of the crime largely depend on the awareness of the existence of human trafficking by the broader public as well as by legal institutions (Tyldum and Brunovskis, 2005), this number is a principal sign of the existence of trafficking in persons. The first indicator is the observed number of victims as a proxy for the extent of the issue. The number of identified victims is only the tip of the iceberg. Given that it is directly affected by the quality of the law enforcement institutions in the destination country, the numbers are lower in host countries with better institutions (see Chapter I), not necessarily where trafficking is less prevalent. Nevertheless, the number of identified victims should be larger where the pool of all victims is larger we therefore expect a positive relationship between the real extent and identified victims. The United Nations Office on Drugs and Crime (UNODC) provides the number of identified victims in their Global reports on Trafficking in Persons (UNODC, 2009a, 2012) for a large set of countries.⁵⁶

The first hypothesis we test is:

Hypothesis 1: A large extent of human trafficking in a country leads to a high number of identified victims, ceteris paribus.

The extent of human trafficking is also reflected in the legal fight against the crime. Fighting HT through prosecution of traffickers, protection of victims and prevention of the crime as well as other approaches taken within countries are thus another indication

⁵⁶ An overview of all variables used can be found in Table A II. 3.

of its magnitude. All three elements of the legal fight against HT (protection, prosecution and prevention) increase the awareness within the country's population, the judicial system and the police forces. Protection policies, for instance, target victims and address their vulnerability, facilitating their identification. Prevention encompasses governmental efforts in promoting awareness about trafficking of persons by means of campaigns, training, information exchange and monitoring of locations prone to trafficking. A measure of these anti-trafficking instruments is the 3P-index provided by Cho et al. (2014).⁵⁷ It is available for the 2001 to 2012 period for over 180 countries. The higher the score a country receives in the 3P-index (on a 3-15 scale), the more rigorously the anti-trafficking instruments are implemented. Presumably two lines of argument are possible as to the implications of a country having a high score in the 3P-index: first, countries with a high human trafficking prevalence fight more rigorously against the crime because they need to further curtail the spread of this criminal activity. Second, countries that fight more rigorously against human trafficking and thereby drive the prevalence of the crime downwards could also have a higher 3P-index score. The latter would imply a negative relationship between the 3P-index and the human trafficking extent while the former would imply the opposite. The *Convention Against Transnational Crime* and the Trafficking Protocol are the results of international observations "that technological advances, combined with the ever-growing inter-dependence of economies, is offering criminal groups unprecedented lucrative opportunities" (Betti, 2001: 1). During the negotiations and the implementation of the *Convention Against Transnational Crime* and the Trafficking Protocol public awareness of the topic increased. Non-governmental organizations (NGO's) intensified public awareness campaigns and media coverage of human trafficking as an international criminal activity became ubiquitous.⁵⁸ This increased salience of the topic lead to a reaction by politics and intensification of the fight against human trafficking (Burstein, 2003 and sources cited there). We argue that besides the pressure the U.S. puts on countries to comply with the

⁵⁷ We apply the overall index (3P-index) in order to not judge the importance of each of the single components. The fight against HT is based on all three, equally important aspects.

⁵⁸ See Ditmore and Wijers (2003) for details on the negotiations about the Trafficking Protocol. For an example of media coverage see Spiegel Online, Menschenhandel: Deutschland hin und zurück, www.spiegel.de/sptv/-extra/a-96636.html (last accessed: 22.05.2014).

Victims of Trafficking and Violence Protection Act (TVPA), countries intensify their fight against HT in parallel to the intensity of the problem within their national boundaries. This leads to the second hypothesis:

Hypothesis 2: The larger the scale of HT in a country the more intense the fight against this crime, ceteris paribus.

Third, the illicit nature of the process has to be addressed by additional aspects that capture the intensity of exploitation indirectly. As argued above, awareness within countries plays an important role in the identification of HT. Given that human trafficking is a large-scale illegal business, its infrastructure must be highly developed. This is also supported by findings in the criminology literature, which stresses the link between the transport of illegal migrants, human trafficking and organized crime along the whole process of deceiving people, transporting, and exploiting them (Salt and Stein, 1997; Salt, 2000; Schloenhardt, 2001). This suggests that the extent of HT in the country is part of the entire prevalence of crime. We capture the hidden nature of the phenomenon by the occurrence of crime measured as the level of crime in the country. We use the crime rate per 100,000 people taken from United Nations Surveys on Crime Trends and the Operations of Criminal Justice System (CTS) (UN-CTS, 2008), which is the most complete cross country crime data available. The third hypothesis is:⁵⁹

Hypothesis 3: The more HT takes place in a country the higher the crime rate, ceteris paribus.

II. 2.2 Causes of human trafficking

Turning to the causes, we identify five main drivers. Since the application of the common definition of human trafficking in 2000, the number of studies on the causes of human trafficking has increased substantially (e.g., Akee, Basu, Chau and Khamis, 2010; Cho, 2013; Hernandez and Rudolph, 2015 [Chapter I]).⁶⁰ We focus on the determinants

⁵⁹ Theoretically it is plausible that other criminal activity such as drug and weapon smuggling is causing HT as well as indicating its prevalence. This issue is discussed in the next section.

⁶⁰ All determinants used in the empirical literature so far are tested in the meta-study by Cho (2012) where she identifies robust causes of human trafficking flows.

robustly identified as causes of HT, give an intuition for the use of each of them, and scrutinize them in the next section.

One main driver of migration and human trafficking is the difference in economic opportunities. On the one hand, criminals seek high profits through illegal activity located in prosperous countries or, on the other hand, giving individuals the incentive to migrate in search of formal job seeking to these countries. This makes affluent countries one of the main targets for both traffickers and potential victims. The extent of economic opportunities and thus demand for HT is reflected in the income level of a country. The ideal destination country for HT is a high income country which can act as a breeding ground for this type of activity. We use income measured by GDP per capita (in logs) taken from the World Bank's (2012) Development Indicators (WDI) and state Hypothesis 4:

Hypothesis 4: The richer the country, the larger is the extent of HT, ceteris paribus.

Most cases of forced labor other than prostitution involve migrant workers in economic sectors such as agriculture and construction (Zhang, 2012). They account for 18 percent of identified cases of HT according to the UNODC (2009). The increased chances of employment caused by the increased demand for cheap unskilled labor increases the attractiveness of countries as destination for migration workers (Hernandez and Rudolph, 2015 [Chapter I]).⁶¹ In addition, high demand in the commercial sex market or other informal markets increases the probability of pushing people towards these locations (Cho et al., 2013; Jakobson and Kotsadam, 2013; Danailova-Trainor and Belser, 2006). The optimal case would be to use a measure of demand in all possible exploitative low skilled labor positions including exploitation in the sex industry, construction, house work, agriculture as well as the number of illegal organ removals. Given the scarcity of data in this area we are bound to use employment in agriculture as a percentage of total employment, data for which is provided by the World Bank (2012). This suggests Hypothesis 5:

⁶¹ South-south migrants in particular have to rely on informal support systems rather than welfare benefits of their host countries, which makes them even more vulnerable (Avato et al., 2010).

Hypothesis 5: The larger the demand for low-skilled services where exploitation takes place the higher the prevalence of HT in the country, ceteris paribus.

Note that international investment relations lead to increased cultural, social and economic interrelation between countries, which can also be associated with HT. Human trafficking is a negative externality of increased international connectedness, facilitated, but also hampered, by different aspects of the globalization processes. On the one hand, it is facilitated because the transport of individuals is simplified via the establishment of international trade routes and investment connections. International crime groups are large-scale business operations that are active in both the official and the informal economies, corrupting officials and legal networks (UNODC, 2010). Foreign investment connections and trade relations are captured by the stock of foreign direct investment (FDI) as a percentage of GDP (UNCTAD, 2012).⁶² This variable captures the international presence in the country and thus the extent of international connections and relations.

Hypothesis 6: International investment connectedness increases human trafficking presence in the country, ceteris paribus.

On the other hand, trafficking may be limited via technological advancements and more personal contacts. This increases information availability to individuals on migration opportunities as well as job offers and thus presumably reduces the risk of being trafficked. Therefore, international tourists and information flows should have a restricting effect on trafficking. Increased personal contacts are captured by tourism arrivals as an additional channel of information transmission. Emigration puts individuals in a vulnerable position which is further increased by language differences and incomplete knowledge of the destination country. These differences captured by including linguistic fractionalization and the share of international migrants in our model. We employ the language component of the distance-adjusted ethno-linguistic

⁶² In addition, this argument is the observation that spatial dependence has been found to work as a trigger for positive externalities such as the spillover-effect of advancing women's rights (Neumayer and de Soysa, 2011). We argue this link can also act as a transport system for negative externalities such as international criminal networks transporting human beings.

fractionalization index (DELF) developed by Kollo (2012).⁶³ Tourism arrivals proxies for personal contacts as an additional channel of information transmission using the variable in the WDI data set (World Bank, 2012).

Additionally the size of the countries measured by population is presumably an important determinant of the demand structure and the size of the exploitation market within countries. The size of the population in logs, which reflects the size of the countries, as well as the number of international migrants and the number of refugees by country of origin, are all drawn from the same World Bank (2012) database. Given that the most vulnerable part of the migrant population is the most prone to traffickers, e.g., refugees fleeing situations in which they face political harassment and life-threatening persecution, it seems reasonable that this part of the population is also largely affected. This hypothetical relationship is accounted for by the number of refugees in destination countries.

Hypothesis 7: Human trafficking is increased by factors that force migration and attract people to a specific (rich) country, ceteris paribus.

Finally, as detailed before, HT is associated with organized crime groups which engage in other activities such as drug and weapon smuggling (Europol, 2011). These multiple activities are carried out by cells/groups that specialize in these different areas leading to a proliferation and intensification of activities (Aronowitz, 2001; Salt, 2000; Schloenhardt, 2001). In this context it is reasonable to imagine that the trafficking routes established by criminal networks enable the continuance and expansion of trafficking.⁶⁴ Following this argument, we also test whether criminal activities detected in the country are causing factors of HT. This hypothesized relationship is analyzed by testing how both the

⁶³ This index accounts for (dis-) similarities between languages, which is crucial in human trafficking because potential victims are more vulnerable if the destination country's language is different from their own. These new data are an improvement compared to Cho (2012) and Akee et al. (2010) who use the ethnic fractionalization index (ELF) of Alesina et al. (2003). The ELF only considers the number of different languages in a country thereby disregarding the crucial aspect of the distance between languages accounted for in the DELF. In the context of the trafficking process language differences are crucial since small distances may already lead to a different understanding of exploitation. The results are not qualitatively different when the ELF index is employed.

⁶⁴ International criminal activity is rather successfully fought against by Interpol (Sandler et al., 2011) as well as other institutions, but the ability of criminal networks to adapt to changing environments often advances institutional adjustments which makes the fight against it difficult (Williams, 2001; Kenney, 2009).

amount of heroin seized in countries (as a proxy for drug trafficking) and the number of drug trafficking offences committed/reported creates human trafficking (Cho, 2015). We use the data from the UN Crime Surveys (UN-CTS, 2008) and hypothesize:

Hypothesis 8: Crime activities also have causal effects on human trafficking, ceteris paribus.

These eight theoretical predictions are the basis for the MIMIC model of human trafficking and are now brought to the data. In Table II.A1 we show an overview of the hypotheses.

II. 3 A MIMIC MODEL OF HUMAN TRAFFICKING

The application of the MIMIC method is introduced in economics by Jöreskog and Goldberger (1975). Subsequently, it has been used in numerous studies to measure unobservable variables such as the underground economy (e.g., Frey and Weck-Hanneman, 1984; Loayza, 1996; Schneider, Buehn and Montenegro, 2010; and Buehn and Schneider, 2012), corruption (Dreher et al., 2007), and international goods smuggling (Buehn and Farzanegan, 2012).⁶⁵ Multitudinous studies explored further determining aspects and the development of underground activity across and within countries (among others Loayza, 1996; and Buehn, 2012). The large amount of studies shows, on the one hand, the importance of structural equation modeling in economics and on the other hand, the value of this approach in addressing illicit phenomena that are difficult to capture due to their very nature. Given the characteristics and clandestine nature of the trafficking process, this estimation strategy offers a valuable method to address it in a holistic way.

Several reasons speak for the application in this context: first, human trafficking is an economically significant criminal activity with huge profits while evading taxes. Second, international HT receives increased attention in the global policy arena and the international community is willing to fight it. This already spurred an increase in studies analyzing the underlying process in law, political science and economics. However,

⁶⁵ Additionally, Di Tommaso et al. (2007) and Kuklys (2004) analyse institutional change in Eastern Europe and welfare, respectively. Buehn and Eichler (2009) explore the connection of smuggling illegal and legal goods and Buehn and Farzanegan (2013) develop an index of global air pollution.

international trafficking in human beings is a multidimensional unobserved phenomenon, where the whole process happens in the underground economy and neither traffickers nor victims are easy to identify. A latent variable approach such as the MIMIC is thus well suited to address its unobservable nature. Through key determinants and indicators being considered at once, light is shed on the presence and magnitude of human trafficking in a country.

Third, the possibility to estimate parameters of a single structural equation has great value over estimating numerous regressions. The MIMIC approach is based on the assumption that the causal factors of the latent phenomena are not considered independently. HT is a process with many facets where several factors shape the incentive structure of all the actors involved, i.e., traffickers, victims and governments. This was highlighted in the discussion of the causes in Section II. 2.2.

The assumptions made about the effects of the latent variable have to be considered carefully. Cliff (1983: 120) argues that there might be relevant divergence between the observed indicators and the latent phenomenon. This is especially important when interpreting correlations and model estimates established from the latent variable specifications and relating them directly to the unobserved phenomenon. In order to reduce doubts we test the model in several different specifications and turn to fit indicators to proof that the final model fits the data well and the underlying assumptions can be confirmed.

II. 3.1 The model

The main idea behind the Multiple Indicators Multiple Causes (MIMIC) model is to use covariance information of observed factors influencing the latent variable, i.e. human trafficking. The two groups of observed variables, i.e., indicators and causes, are then modeled according to the hypothesized relationships. The indicators are related to the unobserved variable in a measurement model showing the effect of the latent variable. The relationships of the causes to the unobserved variable are simultaneously considered in a structural model. The MIMIC model specifically compares the covariance matrix of the imposed relationships with the sample covariance and allows

us to estimate a measure of the extent of the latent construct.⁶⁶ This leads to the following two equations:

$$\mathbf{y} = \beta\eta + \varepsilon \quad (\text{II. 1})$$

$$\eta = \alpha' \mathbf{x} + \omega \quad (\text{II. 2})$$

In the measurement model Eq. (II.1) the vector $\mathbf{y} = (y_1, y_2, \dots, y_m)'$ is the vector of indicators solely determined by the latent factor η , $\beta = (\beta_1, \beta_2, \dots, \beta_m)'$ is the corresponding coefficient vector and $\varepsilon = (\varepsilon_1, \varepsilon_2, \dots, \varepsilon_m)'$ is the disturbance vector. In Eq. (II.2) the structural model shows that the latent variable η is determined by exogenous causes with error ω . The vector $\mathbf{x} = (x_1, x_2, \dots, x_s)'$ includes all potential causes and $\alpha = (\alpha_1, \alpha_2, \dots, \alpha_s)'$ is the coefficient vector that describes the relationship between the causes and the latent variable. This estimation strategy not only has the advantage of making it possible to test the theorized relationships between the causes and indicators and the latent variable by estimating the parameters of the model, but it also provides us with the tools to test the fit of the theorized relationships with the underlying data.

II. 3.2 Application to human trafficking

In order to test the hypothesized relationship between the determinants and effects of HT the following (base line) MIMIC model of HT intensity (η) is implemented. The measurement model is specified by the indicators: crime rate per 100,000 people, the 3P-index of anti-trafficking policies⁶⁷ and the number of identified victims.

$$\begin{bmatrix} \text{crime rate}_i \\ 3P - \text{index}_i \\ \text{victims}_i \end{bmatrix} = [\beta_1, \beta_2, \beta_3] \times [\eta] + [\varepsilon_1, \varepsilon_2, \varepsilon_3] \quad (\text{II. 3})$$

The structural model include causes of human trafficking that influence the vulnerability of individuals thereby pulling them towards promising destination countries as well as criminal aspects of the phenomenon. The basic causes used in the modeling process of the MIMIC model are income per capita in logs, foreign direct investment flows into

⁶⁶ The model is presented in more detail in Appendix II.B.

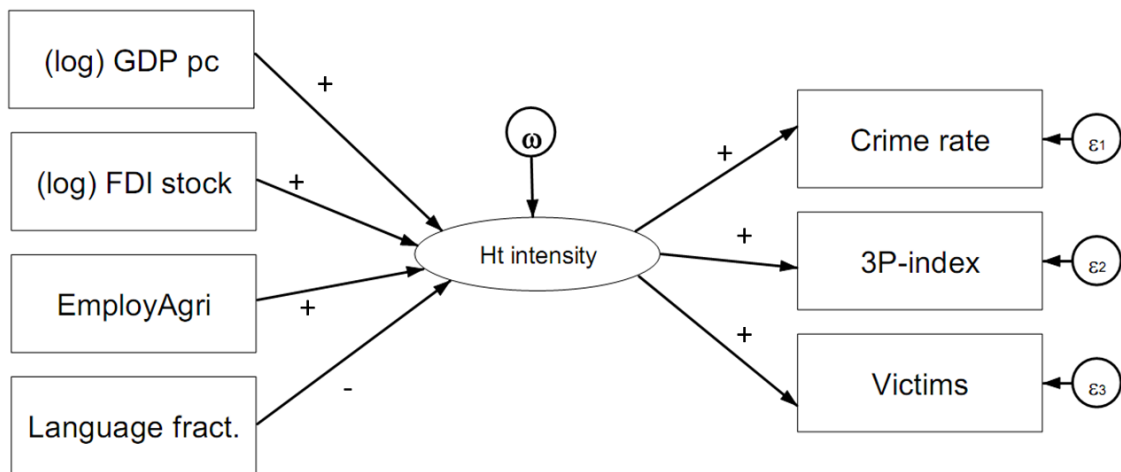
⁶⁷ A detailed description of the construction of the 3P-index is available in the paper Cho et al. (2014) and online on the project webpage: www.human-trafficking-research.org.

destination countries (in logs), employment in agriculture as a percentage of total employment in these countries (employagri) and language fractionalization (language fract.) within the respective destination countries.

$$[\eta] = [\alpha_1, \alpha_2, \alpha_3, \alpha_4] \times \begin{bmatrix} (\log) GDP pc_i \\ (\log) FDI stock_i \\ employ agri_i \\ language fract._i \end{bmatrix} + [\omega] \quad (II. 4)$$

MIMIC models are represented by path diagrams. Figure II. 1 shows the path diagram for human trafficking intensity in destination countries. The latent variable "HT intensity" is jointly estimated by its causes and indicators. On the left hand side the structural model indicates the relationship between the causes of human trafficking in destination countries measured with error ω , the disturbance term of the structural estimation. On the right hand side of the path diagram the arrows that point towards crime rate, the 3P-index and identified victims show the measurement model.⁶⁸ The figure displays the specification with the best model fit discussed in Section II. 4.

Figure II. 1: Path diagram of MIMIC



Notes: The path diagram is based on specification three, Table II.1.

To estimate the MIMIC model we use maximum likelihood including the information contained in missing values, i.e., no observations are dropped (maximum likelihood

⁶⁸ In a path diagram the circles indicate unobservable aspects of the model whereas the squares indicate observable variables.

with missing values). This is common in the application of MIMIC models (see various sources cited before). Collins et al. (2001) have shown that using all the information available leads to unbiased and efficient estimates and is therefore preferable to list-wise or case-wise deletion.⁶⁹ Our estimates are, thus, not affected by sample selection. We proceed as follows: first, we implement the model for the 2000-2010 period and explain why we use the basic specification shown in the path-diagram. Then, we estimate yearly repeated cross-sections.⁷⁰ For the yearly specification we use multiple imputation for the main control variables to again get a constant sample. This is equivalent to the application of maximum likelihood with missing values; both approaches are model based methods of dealing with incomplete data analysis (Little, 1992).⁷¹ Finally, we generate our HT intensity index based on these yearly estimates.

The results reported in the next section include several combinations of causes and indicators. This takes stock of the fact that causes and indicators are not clearly separable (Dreher et al., 2007). In some cases it is theoretically plausible to interchange causes and indicators (Section II. 2). In these cases of uncertainty, the indicators are also implemented as determinants. Since the MIMIC is a special case of confirmatory factor analysis, a priori decisions on the model composition become necessary. However, we show that our main assumptions on the interplay with human trafficking are supported by the data.

Following standard practice, we also include all variables with their contemporaneous values after having been transformed to deviations-from-mean and are scaled to have unit standard deviation. The reason for this transformation is that the different variables are measured on different scales. In order to have the same scale when entering the ranking estimation the variables are standardized (see, e.g., Buehn and Farnazegan, 2012). Concerns about endogeneity or reverse causality in these specifications could arise. In order to deal with this issue of simultaneity bias the results are re-estimated by including all quantitative causal variables with a one period lag as

⁶⁹ Therefore the number of observations does not change across specifications (Table II. 1).

⁷⁰ Given that the model is an analytical tool for cross sections, the yearly estimates are derived by repeated cross-sections.

⁷¹ The control variables (Table II. 2) are imputed using multiple imputation (MI), i.e., the standardized continuous variables are imputed using chained regression with 20 imputations. Application of Rubin's (1987) rules of adjustment leads to efficient estimates of the coefficients and standard errors.

suggested by Dreher et al. (2007). The results do not change qualitatively. They are also fairly robust to different sensitivity tests detailed below.

II. 4 RESULTS

Note that the principal MIMIC specification considers only cross-country variation. All variables discussed above are tested in a number of models. After testing the robustness of the different specifications and evaluating the model fit the specification with the best fit is used for the final index. In this way country rankings for every single country-year combination are generated, which makes it possible to assess the development of the extent of HT over time. As discussed above the decade of 2000-2010 saw a rise in quantitative research on human trafficking, which was at least partially spurred by the United Nations officially defining trafficking in persons in 2000. Additionally, due to the availability of data, the years between 2000 and 2010 appear to be the most useful in exploring the major causes and indicators empirically. Subsequently, the general to specific approach is applied to exclude the variables that are insignificant at least at the 10 percent level or above.

Before turning to the results, we discuss the background on which we will judge the validity of our results. This is necessary since final judgment is based on the statistical importance (significance) of the causes and indicators as well as fit indices common in structural equation modeling (Bollen, 1989). In tandem with theoretical considerations the simplest specification is finally used to compare the extent of human trafficking in destination countries.⁷²

Given that structural equation modeling (SEM) is confirmatory in nature the significance of the variables is only one indication of model quality. The overall fit of the model and significance levels both indicate whether the hypothesized relationships can be rejected or confirmed (Bollen, 1989). The judgment of the quality of the model is based on whether the estimated covariance is equal or close to the true sample covariance. To decide which model fits the data best and thus approximates the latent variable most precisely, Barrett (2007: 815) argues that the chi-square hypothesis test is

⁷² The results do not change qualitatively when additional causes or indicators are included (all 11 model specifications are displayed in Table II. 1 and explained in Section II. 4.1).

“the only substantive test of fit for SEM.” Nevertheless, we explain and evaluate other fit indices suggested in the literature to support the salience of our decision.

The chi-square statistic compares the empirical model against the alternative that the covariance matrix of the observable variables is unconstrained. The null hypothesis is that the model reproduces the covariance matrix of causes and indicators. Smaller test statistic values indicate that the model is a better fit, which implies that the null hypothesis is not rejected. Looking at the main results in Table II. 1 the null hypothesis of a perfect fit cannot be rejected for specifications (1), (3), (7), (9) and (10). In these estimated specifications the p-values range between 0.13 (specification 9) and 0.32 (specification 7).

The root mean squared error of approximation (RMSEA) evaluates the model fit on the basis of the difference between the two co-variances. Better fit is implied with an RMSEA value equal to or below 0.05 and a high p-value, indicating high probability to obtain a low RMSEA (Browne and Cudeck, 1993). This is the case in three of the five specifications not rejected by the chi-square statistic before: (3), (7) and (10).

Bentler (1990) suggests to judge model fit based on the comparative fit index (CFI) and the Tucker-Lewis index (TLI). A good model fit is indicated by values close to one (Hu and Bentler, 1999). This criterion is met by all five specifications with values around 0.93-0.99. Next, the coefficient of determination (CD) is comparable to the R-squared statistic of conventional regression analysis signaling the explained variation. Higher values indicate better fit. The variation explained is around 0.63 in the five models considered here.⁷³ We use all five models with acceptable model fit to generate our HT intensity measure based on factor scores.⁷⁴

⁷³ A more detailed description of all goodness of fit indices in structural equation modelling is given by Iacobucci (2010). A critical assessment of the use of goodness of fit indicators is provided by Barrett (2007) who argues that the decision rules based on these indicators are arbitrary. He argues that the chi-square statistic is the “only substantive test of fit for SEM” (p. 815).

⁷⁴ The factor score is the preferred method to build the ranking of countries, because it includes more structural information in the final index than simple linear prediction. It is suggested by Jöreskog (2000) and employed by most of the studies mentioned above. Another approach is the linear prediction multiplying the standardized coefficients with the standardized data in order to derive a measure of the latent variable. It is employed by Frey and Weck-Hannemann (1984), and recently by Buehn and Farnazegan (2013). In order to test whether the country ranking depends on the method of index construction both approaches are implemented. The rank correlation is larger than 0.9 showing that the method is not decisive for ranking.

II. 4.1 MIMIC estimation results

The results of the MIMIC estimations are displayed in Table II. 1, showing the point estimates.⁷⁵ The top panels show the structural model and the relationship of causes. The middle panels show the measurement model with the indicators and the lower panels display the fit indices. Column one presents the base line specification of principal causes and indicators and all additional hypothetical causes of human trafficking are included in the subsequent specifications 2 to 11. The focus is on the causes and indicators of HT in countries where exploitation takes place, i.e., destination countries. All causes in column 1 are statistically significant with an acceptable overall model fit. Looking at the extent of human trafficking in these countries, (log) income per capita, the share of employment in agriculture and (log) foreign direct investment are the simplest and most basic combination of determinants. The observed correlation of GDP per capita is positive and significant at the 1 percent level across specifications indicating that wealthier countries are more often the destination of HT. Investment flows into destination countries are also positively associated with human trafficking. More international business and investments are correlated with more illicit human movement in the form of HT. The effect is significant over all specifications. The observed robust positive relation of the share of employment in agriculture endorses the positive relation between HT and cheap working opportunities with more potential placements for traffickers to exploit people. Our results endorse that labor exploitation is a major precondition for trafficking occurrences.

Linguistic fractionalization within countries has a negative and significant relation to trafficking (column 3). This suggests that less diverse countries observe more human trafficking within their borders. While column 2 has no acceptable model fit with a low p-value and a large chi-square statistic, column 3 shows acceptable values in all fit indicators according to the cut off thresholds of the indices discusses before.

The size of the market for victim exploitation is measured by (log) population. We find the expected sign and the coefficient to be statistically significant at the 1 percent level. However, the model fit is unsatisfactory with a low p-value and incongruous fit

⁷⁵ All estimations have been performed using STATA 12.1.

indicators. Columns 5 the international migrants share and in column 6 the share of international tourists arrivals are both negatively related and are significant at the 1 and 5 percent level, respectively. These results are contrary to general expectations and difficult to explain. We refrain from a detailed explanation because the fit indices show poor model fit, which indicates that the results are not reliable. The test of the correlation between refugees and share of HT victims in the country reveals an insignificant correlation.⁷⁶ The results do not support the hypothesized relationship between refugees and the extent of HT. The model fit, however, suggests that the estimated covariance resembles the actual covariance of the data quite well. Therefore, specification 7 is also tested in predicting the final measure.

⁷⁶ The test of identified victims as a causal variable for trafficking intensity is based on the argument of Dreher et al. (2007) and Buehn and Schneider (2012) who write that it is difficult to clearly differentiate between causes and indicators in the MIMIC approach. This is applicable here as well: identified victims could theoretically also induce trafficking inflows. Established placements of victims and former victims turning into traffickers would suggest a determining nature. However, this is not supported by the data.

Table II. 1: MIMIC HT-prevalence determinants and indicators

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Structural model (causes)	0.949*** (6.436)	0.828*** (4.945)	0.979*** (6.685)	0.948*** (6.716)	1.131*** (8.150)	1.037*** (6.890)	0.926*** (6.182)	0.966*** (6.485)	0.810*** (5.515)	0.943*** (6.278)	1.014*** (6.946)
(log) FDI share	0.168** (2.202)	0.104 (1.253)	0.179** (2.370)	0.242*** (3.227)	0.131* (1.922)	0.210*** (2.705)	0.176** (2.269)	0.175** (2.279)	0.148* (1.943)	0.168** (2.199)	0.179** (2.434)
Employment in agriculture	0.383** (2.455)	0.477*** (2.991)	0.438*** (2.796)	0.405*** (2.848)	0.412*** (2.966)	0.415*** (2.729)	0.367** (2.344)	0.398** (2.535)	0.309** (1.981)	0.375** (2.348)	0.387*** (2.788)
Info flow		0.234 (1.509)									
Language fractionalization			-0.132* (1.882)								-0.039 (0.591)
(log) Population				0.230*** (3.237)							0.099 (1.339)
International migrants					-0.300*** (4.837)						-0.219*** (3.142)
Tourism arrivals						-0.159** (1.966)					-0.068 (0.874)
Refugees							-0.087 (0.858)				
Share of victims								-0.060 (0.812)			
Drug trafficking offences									0.277*** (3.506)		0.220*** (3.072)
Heroin seizures										-0.019 (0.214)	
Measurement model (indicators)	1 0.690*** (5.973)	1 0.773*** (5.672)	1 0.684*** (6.065)	1 0.828*** (6.115)	1 0.751*** (6.612)	1 0.742*** (6.086)	1 0.671*** (5.920)	1 0.687*** (5.963)	1 0.705*** (6.266)	1 0.689*** (5.975)	1 0.825*** (6.748)
Share of victims	0.040 (0.333)	0.063 (0.490)	0.038 (0.319)	-0.006 (0.044)	0.018 (0.145)	0.036 (0.292)	0.040 (0.340)	0.040 (0.340)	0.067 (0.543)	0.040 (0.338)	0.015 (0.118)
# of Countries	142	142	142	142	142	142	142	142	142	142	142
Chi-square [p-value]	9.39 [0.15]	31.03 [0.00]	9.40 [0.31]	36.07 [0.00]	16.16 [0.04]	16.54 [0.04]	9.26 [0.32]	6.34 [0.10]	12.52 [0.13]	9.93 [0.27]	43.72 [0.00]
RMSEA [p-value]	0.06 [0.33]	0.14 [0.00]	0.04 [0.55]	0.16 [0.00]	0.08 [0.15]	0.09 [0.14]	0.03 [0.56]	0.09 [0.20]	0.06 [0.32]	0.04 [0.51]	0.11 [0.01]
CFI	0.97	0.83	0.99	0.81	0.94	0.93	0.99	0.97	0.96	0.98	0.84
TLI	0.94	0.69	0.98	0.65	0.89	0.87	0.98	0.92	0.93	0.97	0.73
CD	0.59	0.63	0.62	0.68	0.75	0.63	0.59	0.59	0.68	0.59	0.86

Notes: Absolute z-statistics in parenthesis, *** p<0.01, ** p<0.05, * p<0.1; Fit indicators are described in the text.

Finally, criminal activities in column 9 and 10 show the hypothesized relationships. The coefficient for drug trafficking (column 9) is positive and significant at the 1 percent level. An increase in the share of drug trafficking offences detected in a country is positively associated with HT. The fit indicators show a good model fit. In contrast, heroine seizures (column 10) seem not to have a significant relationship with the extent of HT. The model fits the data acceptably well. Finally, in column 11, all significant causes are tested at once. The model fit is lower, but the variables qualitatively show the same results.

Turning to the measurement model, we find all indicators to match our expectations. One of the indicators of the latent variable has to be normalized and used as an anchor variable for the scale and identification.⁷⁷ We follow the literature using the indicator with the largest standardized coefficient as the anchor variable (e.g., Schneider et al., 2010; Buehn and Schneider, 2012; Dreher et al., 2007). The anchor used here, and over all models in the analysis, is the crime rate. The coefficient is normalized to one, resulting in a standardized coefficient of around 0.88 on average across all specifications (not shown). All three indicators are positively related to the extent of human trafficking, which is in line with theoretical considerations and economic intuition. The number of identified victims as a share of the population turns significant in only some of the yearly applications (see Table II. 2). Arguably this indicator is very important but identification capacity depends on many aspects of countries' legislative infrastructures (Laczko and Gozdzia, 2005). We argue that important aspects of the trafficking process are identifiable by employing identified victim numbers even though the results are not significant. Identified victims are part of the prevalence of HT in destination countries and yield important information as shown by Hernandez and Rudolph (2015 [Chapter I]). Furthermore, model fit is good including those variables.

The 3P-index of anti-trafficking policies turns positive and significant at the one percent level in all specifications. This shows the importance of anti-trafficking policies that protect victims, prosecute traffickers and prevent HT in reflecting the intensity of human trafficking in the country. These results support the hypothesized relationship

⁷⁷ The choice of the anchor does not change estimation results qualitatively (Bollen 1989).

between the extent of human trafficking and efforts to curb it: countries with more trafficking in persons and more exploitation of their people are more proactive in their fight against HT and reach a higher score in the 3P-index.

The response of human trafficking into the country is expressed in units of standard deviation for a one standard deviation change in an explanatory causal variable holding all other variables constant (Bollen, 1989).⁷⁸ We give a preview of the size of the effects here, but they are not shown in the table and are available upon request. We explain the effects of the main causal variables of the full model (column 3, Table II. 1). A one standard deviation increase in GDP per capita is correlated with an increase in the magnitude of human trafficking by 1.08 standard deviations. A one standard deviation increase of the FDI share and the share of employment in agriculture relate to an increase in the extent of human trafficking by 0.2 and 0.48 standard deviations respectively. A decrease in the standard deviation of language diversity increases human trafficking by more than 0.15 standard deviations. Turning to the other effects that support our hypotheses we see that human trafficking reacts to an increase of one standard deviation of the exploitation market (measured by population) by 0.28 standard deviations (specification Table II. 1 column 4). The magnitude of the effect for drug trafficking detected shows an increase in HT of 0.31 standard deviations if the share in detected offences increases by one standard deviation. Turning to the indicator variables, the standardized coefficient of the crime rate indicates that an increase in human trafficking by one standard deviation increases the crime rate by around 0.88 standard deviations on average over all specifications. The 3P-anti-trafficking policy measure increases by 0.62 standard deviations and the number of victims by 0.04 standard deviations given an increase in the extent of human trafficking by one standard deviation on average. The results are fairly robust over all specifications.

Robustness tests

Before we move to the yearly application we undertake several sensitivity tests to confirm our results are robust to a variety of circumstances. First, the described results

⁷⁸ The standardized coefficients are calculated by using $\tilde{\beta}_{ij} = \hat{\beta}_{ij} \sqrt{\hat{\sigma}_{ii} / \hat{\sigma}_{jj}}$ where i represents the causal variables and j the unobservable variable. The predicted variances under the squared root are the variances of the i th and j th variables, respectively. The results are available upon request.

do not depend on the method used nor are they driven by specific countries. Testing the robustness of different models to the application of maximum likelihood and case-wise deletion we find that the number of observations is lower and varies across specifications (Table A II. 2). The reason is that now some of the data for causes and indicators are not available for all countries. We can show that the results do not change qualitatively and stay largely the same quantitatively. The significance of the factors decreases, which does not affect the model fit. The goodness of fit indicators still show good results for the five specifications highlighted above. As has been shown by several studies (see, e.g., Little and Rubin, 1987, and their references) the deletion of observational units due to missing values is rather ad hoc and comes with several well-documented problems. Case-wise deletion, common in social science, might remove a high proportion of observations and make the estimates inefficient because only few observational units have complete data. This comes together with a possible selection bias if the complete cases are not representative of the entire sample (Schafer and Olsen, 1998). We avoid these problems by using the full information maximum likelihood estimates and multiple imputations.

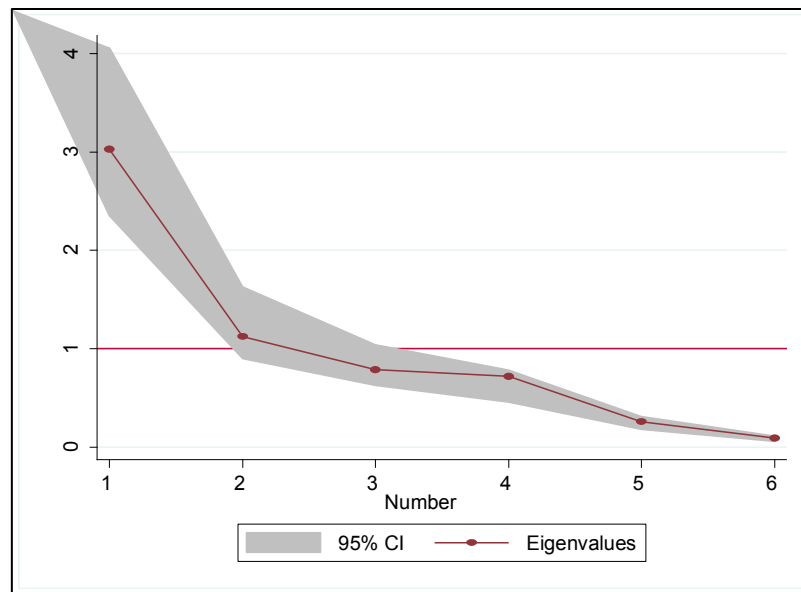
A second test suggested is to exclude the three highest and lowest ranking countries of the resulting measure (e.g., Buehn and Farzanegan, 2012). This exclusion tests whether outliers at the top and bottom of the ranking drive the results. Generally the fit of the specifications decreases, but qualitatively the results are not affected. All fit measures are in line with previous findings. To rule out endogeneity concerns we also estimate the results following Dreher et al. (2007) and lagging all quantitative causal variables by one period before estimating the model again. The analysis is robust to this sensitivity test and the results are not changed.⁷⁹

An important issue in using the MIMIC approach is whether the assumption that the variables identify one latent factor holds. The results seem to support the theoretical argumentation and our hypotheses in what drives and what reflects the extent of human trafficking in countries of exploitation. We use a principal component analysis (PCA) to further show that the variables chosen identify one latent factor. Figure II. 2 shows a

⁷⁹ Both findings are available from the authors upon request.

screen plot of this exercise. The plot indicates that the first component has an eigenvalue above three and the second component has an eigenvalue just above one. According to the Kaiser rule one should keep all components with an eigenvalue above one. However, the screen plot indicates that most of the variation in variables is sufficiently explained by one component. This supports our hypothesis that the observed variables identify the one latent factor, the extent of human trafficking.

Figure II. 2: Screen plot of eigenvalues after principal component analysis



Notes: Own calculation.

Based on these results, the final specification for the yearly index is chosen. Model 3 (Table II. 1 column 3 and see also Figure II. 1) includes the main causes of the extent of HT together with the main indicators making HT visible in countries. Table II. 2 shows the estimates for the yearly applications. The estimates are robust over time and agree with the baseline specification described above (Table II. 1, column 3). The chi-square test and the respective p-values of the models show a good fit in almost all years. Interestingly, in this application we find the number of identified victims turn statistically significant in some of the years (2001, 2002, 2004). This further supports the validity of our approach. The human trafficking intensity index is constructed based on these estimates. The next step is to generate the country ranks according to their expected rate of human trafficking prevalence.

Table II. 2: MIMIC estimates (yearly)

	(2000)	(2001)	(2002)	(2003)	(2004)	(2005)	(2006)	(2007)	(2008)	(2009)	(2010)
Structural model (causes)											
(log) GDP pc const	0.836*** (6.420)	0.922*** (7.333)	0.960*** (7.545)	0.849*** (6.415)	0.727*** (5.206)	0.837*** (6.097)	0.804*** (5.878)	0.821*** (6.268)	0.822*** (6.078)	0.852*** (6.090)	0.829*** (5.851)
(log) FDI stock	0.066 (1.361)	0.061 (1.026)	0.043 (0.748)	0.028 (0.456)	-0.008 (0.130)	0.076 (1.178)	0.089 (1.378)	0.099 (1.574)	0.070 (1.089)	0.039 (0.585)	0.064 (0.944)
Employment in agriculture	0.257* (1.934)	0.375*** (3.013)	0.430*** (3.456)	0.344** (2.574)	0.377*** (2.930)	0.313** (2.215)	0.293** (2.157)	0.280** (2.122)	0.269** (1.994)	0.326** (2.337)	0.301** (2.120)
Language fractionalization	-0.070 (1.109)	-0.067 (1.132)	-0.053 (0.918)	-0.068 (1.100)	-0.044 (0.719)	-0.064 (0.997)	-0.062 (0.983)	-0.091 (1.491)	-0.089 (1.412)	-0.102 (1.571)	-0.103 (1.532)
Measurement model (indicators)											
Crime rate	1	1	1	1	1	1	1	1	1	1	1
Overall 3P-Index	0.584*** (4.989)	0.734*** (5.732)	0.719*** (5.121)	0.797*** (5.329)	0.985*** (4.363)	0.681*** (5.027)	0.722*** (5.216)	0.668*** (5.110)	0.622*** (4.897)	0.639*** (4.840)	0.495*** (3.746)
Share of victims	0.202 (1.612)	0.275** (2.123)	0.285** (2.057)	0.122 (0.778)	0.285* (1.672)	0.006 (0.046)	-0.008 (0.058)	-0.030 (0.235)	-0.010 (0.082)	0.028 (0.226)	0.154 (1.387)
Number of countries	142	142	142	142	142	142	142	142	142	142	142
Chi-square	13.01	8.70	10.91	20.82	15.85	16.31	8.35	7.31	5.31	4.11	2.97
(P-value)	0.11	0.37	0.21	0.01	0.04	0.04	0.40	0.50	0.72	0.85	0.94

Notes: Absolute z-statistics in parenthesis. Estimation by maximum likelihood estimation with robust standard errors and a mean- and variance adjusted test statistic (Maximum Likelihood with Missing Values, MLMV); *** p<0.01, ** p<0.05, * p<0.1. See notes Table II. 1.

II. 4.2 Human trafficking index

After disentangling the relationships between human trafficking and the observed causes and indicators, we now turn to the construction of our HT intensity index and a ranking of the 142 countries under study. An important question is what our measure captures and how it can be interpreted. Given that trafficking in persons is a multi-dimensional process involving many actors (i.e. traffickers, victims, the public, nation states) a clear assignment is difficult to make. The definition of human trafficking provided by the Palermo Protocol broadly describes the aspects and components included. As described in Section II. 2, human trafficking includes all forms of exploitation and aims at all groups of actors involved, traffickers as well as victims. We focus on the destination countries where exploitation takes place. Thus, we capture the extent of HT in these countries as a bundle of actions and decisions. This includes the decision of traffickers to send individuals to these countries and exploit them. Additionally, it includes the extent of market failure ensuring the exploitation of victims and the demand for cheap labor as well as a share of the population (vulnerable and marginalized) that is easily exploited. The HT intensity index provides an assessment of human trafficking relative to other countries in all dimensions of the process. This shows that creating a clear picture of the extent and dimensions of human trafficking in countries is still very difficult. Nevertheless, we are confident that we capture the main aspects causing and indicating HT in destination countries and provide the first objective human trafficking intensity index (or at least the beginnings of one).

The derived index is superior to existing measures of aspects of human trafficking. For example, the tier score of the U.S. Department of State (United States, 2001-2012), which addresses compliance with U.S. policies only, has been criticized as a one-sided approach that reflects political interest rather than being a transparent independent score of the variety of international policy approaches (Simmons and Lloyd, 2010). The underlying measures implemented in the construction of our intensity index, in contrast, are based on publicly available data of causes and indicators that influence human trafficking through different channels.

Country rankings

The results for the measurement and the ranking of all 142 countries for the 2000-2010 period are presented in Table II. 3. The countries are ranked according to the 2005 index to provide an overall picture of the century. The rank indicates the relative position of each country according to the extent of human trafficking into its borders. The cardinal index is scaled between 1 and 100 with lower values for countries with a lesser prevalence of HT.⁸⁰ Unsurprisingly industrialized countries are on top of the ranking. This is in line with the observations in the UNODC Trafficking in Persons: Global Pattern Report (2006: 17). Countries in North-America, Europe as well as Australia are reported to be the top destination countries of HT. The fact that Scandinavian countries rank so high indicates that there are hidden activities taking place in these countries enabling traffickers to exploit individuals to a large extent. Taking their geographic location into account this is less surprising than it seems, given that they are often used as role models of institutional quality. They are close to Russia and Eastern European countries, which have lower economic opportunities and, in Russia's case at times, a higher level of persecution of individuals (traffickers and victims alike). Thus, they are very attractive destinations for the vulnerable and desperate in these countries as well as Middle Eastern, African and Asian nations. It is also in line with the observation that the share of identified victims in these countries is quite high especially in the beginning of the century.⁸¹ Next, countries ranking among the top 20 countries, but lower than the Nordic countries are Spain, Italy and Portugal. These countries are well known to be destination countries for human trafficking, which we also find in our ranking.

⁸⁰ Since the assumptions of the model explicitly indicate causal relationships the retrieved ranking is tied to the causal (cardinal) variables that are used to estimate the model which makes the index a cardinal measure of the difference between countries.

⁸¹ Share of victims in Iceland and Norway in 2000 was 10.4 per 100,000 people, which is one of the highest shares of identified victims across all countries during the decade observed.

CHAPTER II

Table II. 3: Country ranking and index (2000 – 2010)

Country	Rank 2000	Rank 2001	Rank 2002	Rank 2003	Rank 2004	Rank 2005	Rank 2006	Rank 2007	Rank 2008	Rank 2009	Rank 2010
United Kingdom	6 (68)	8 (59)	7 (53)	1 (74)	2 (57)	1 (91)	1 (82)	1 (68)	1 (74)	2 (77)	2 (92)
Sweden	2 (76)	3 (65)	5 (55)	2 (61)	3 (49)	2 (71)	2 (67)	2 (67)	2 (74)	3 (70)	3 (86)
Belgium	9 (62)	6 (60)	12 (52)	5 (57)	8 (48)	3 (64)	5 (60)	5 (61)	4 (66)	7 (58)	7 (62)
Norway	8 (66)	2 (72)	2 (62)	3 (60)	1 (91)	4 (63)	3 (61)	6 (60)	6 (62)	1 (84)	1 (100)
Denmark	4 (70)	4 (61)	4 (56)	4 (60)	5 (49)	5 (62)	4 (60)	3 (62)	3 (69)	6 (61)	6 (65)
Netherlands	7 (67)	5 (60)	6 (54)	6 (57)	4 (49)	6 (60)	6 (58)	4 (61)	5 (65)	5 (65)	5 (71)
New Zealand	3 (71)	18 (49)	19 (48)	24 (41)	24 (40)	7 (58)	9 (55)	11 (54)	10 (56)	14 (51)	12 (52)
Germany	10 (62)	9 (57)	13 (51)	8 (54)	7 (48)	8 (56)	11 (54)	14 (52)	12 (56)	9 (54)	9 (57)
Australia	16 (52)	14 (51)	16 (49)	7 (56)	9 (48)	9 (55)	23 (45)	13 (53)	13 (54)	13 (51)	14 (50)
Austria	13 (55)	11 (55)	11 (52)	9 (54)	11 (47)	10 (55)	8 (55)	9 (56)	7 (59)	11 (53)	10 (56)
Iceland	1 (81)	1 (75)	1 (64)	11 (53)	16 (44)	11 (55)	7 (55)	7 (58)	8 (58)	4 (65)	4 (74)
Luxembourg	14 (54)	10 (57)	3 (59)	10 (54)	6 (48)	12 (54)	10 (54)	8 (57)	11 (56)	10 (53)	13 (51)
United States	17 (50)	17 (49)	14 (50)	13 (53)	10 (47)	13 (54)	13 (53)	15 (52)	14 (53)	16 (48)	15 (48)
Switzerland	18 (50)	13 (53)	8 (53)	12 (53)	15 (45)	14 (54)	14 (53)	12 (53)	15 (52)	19 (46)	18 (46)
Finland	5 (69)	7 (59)	10 (52)	17 (49)	18 (43)	15 (53)	12 (54)	10 (55)	9 (57)	8 (57)	8 (60)
France	15 (54)	16 (50)	15 (49)	14 (51)	13 (46)	16 (52)	16 (51)	16 (50)	17 (50)	15 (49)	17 (47)
Canada	11 (60)	12 (54)	18 (49)	15 (50)	17 (44)	17 (50)	15 (51)	17 (48)	16 (50)	12 (53)	11 (54)
Ireland	22 (45)	15 (50)	9 (53)	18 (49)	19 (42)	18 (48)	18 (46)	18 (48)	23 (45)	18 (46)	24 (42)
Israel	25 (44)	25 (42)	33 (40)	26 (40)	31 (36)	19 (48)	19 (46)	25 (44)	26 (43)	20 (44)	19 (45)
Italy	20 (47)	20 (48)	20 (48)	16 (50)	12 (46)	20 (48)	17 (49)	21 (46)	24 (44)	17 (47)	23 (43)
Spain	24 (44)	19 (48)	22 (47)	19 (46)	14 (45)	21 (46)	21 (46)	23 (45)	22 (45)	27 (41)	21 (44)
Bahamas, The	21 (46)	21 (44)	25 (45)	22 (44)	36 (34)	22 (46)	20 (46)	19 (48)	18 (49)	23 (43)	22 (43)
Portugal	23 (44)	22 (44)	24 (45)	20 (45)	20 (41)	23 (45)	24 (43)	24 (44)	21 (45)	28 (41)	33 (36)
Slovenia	31 (38)	23 (42)	28 (43)	23 (43)	22 (40)	24 (45)	22 (46)	20 (47)	20 (46)	22 (43)	25 (41)
Japan	39 (35)	27 (41)	23 (46)	21 (44)	23 (40)	25 (43)	28 (41)	29 (42)	29 (41)	35 (37)	46 (31)
Czech Republic	27 (42)	30 (40)	35 (38)	25 (41)	29 (36)	26 (42)	26 (42)	26 (43)	28 (42)	29 (41)	26 (40)
Malta	26 (42)	33 (39)	34 (39)	27 (40)	33 (35)	27 (43)	27 (41)	27 (43)	27 (42)	30 (40)	38 (35)
Trinidad and Tobago	37 (36)	39 (36)	41 (36)	38 (35)	56 (29)	28 (39)	25 (43)	28 (43)	25 (43)	21 (44)	16 (48)
Gabon	34 (38)	37 (37)	45 (34)	39 (35)	27 (37)	29 (39)	39 (36)	37 (37)	37 (37)	33 (38)	30 (38)
Croatia	42 (33)	43 (35)	40 (37)	40 (35)	30 (36)	30 (38)	35 (38)	31 (40)	32 (38)	32 (38)	40 (33)
Chile	12 (58)	40 (36)	47 (34)	46 (33)	45 (32)	31 (38)	34 (38)	36 (38)	31 (39)	25 (41)	27 (40)
Poland	32 (38)	32 (39)	36 (38)	33 (38)	28 (37)	32 (38)	36 (37)	22 (45)	19 (48)	26 (41)	28 (39)
Singapore	44 (33)	35 (38)	30 (42)	41 (35)	39 (34)	33 (38)	31 (39)	32 (40)	43 (35)	45 (33)	45 (31)
Estonia	33 (38)	42 (35)	51 (33)	47 (33)	49 (30)	34 (37)	40 (35)	39 (37)	38 (36)	38 (36)	34 (36)
Greece	47 (31)	29 (40)	26 (44)	31 (39)	32 (36)	35 (37)	29 (39)	30 (40)	30 (39)	24 (42)	37 (35)
Korea, Rep.	28 (42)	31 (40)	31 (41)	30 (39)	21 (40)	36 (37)	30 (39)	33 (39)	33 (38)	31 (40)	35 (36)
Hungary	29 (41)	34 (39)	43 (36)	36 (36)	46 (32)	37 (36)	33 (38)	35 (39)	36 (37)	34 (37)	29 (38)
Cyprus	30 (39)	24 (42)	27 (44)	32 (39)	26 (38)	38 (36)	32 (39)	34 (39)	35 (37)	36 (37)	39 (34)
Bahrain	41 (34)	41 (36)	39 (37)	54 (31)	67 (27)	39 (36)	45 (34)	45 (33)	41 (35)	47 (32)	47 (31)
Brazil	35 (37)	46 (32)	54 (32)	43 (34)	43 (33)	40 (36)	41 (35)	43 (35)	34 (38)	37 (37)	31 (38)
Lithuania	46 (31)	45 (33)	50 (33)	34 (37)	34 (35)	41 (34)	37 (36)	42 (35)	45 (33)	51 (31)	66 (27)
United Arab Emirates	36 (37)	28 (41)	21 (47)	28 (40)	37 (34)	42 (34)	42 (34)	38 (37)	46 (33)	43 (33)	64 (27)
Turkey	78 (24)	48 (32)	37 (37)	45 (34)	38 (34)	43 (33)	44 (34)	46 (33)	56 (30)	49 (31)	57 (28)
Swaziland	38 (35)	51 (32)	57 (30)	44 (34)	63 (27)	44 (33)	55 (30)	47 (33)	39 (36)	40 (34)	20 (45)
Slovak Republic	49 (30)	50 (32)	44 (34)	48 (32)	55 (29)	45 (32)	46 (34)	41 (36)	42 (35)	39 (35)	43 (32)
Latvia	57 (28)	56 (29)	59 (29)	55 (31)	48 (31)	46 (31)	43 (34)	48 (32)	49 (31)	58 (29)	53 (29)
Qatar	40 (34)	26 (42)	17 (49)	29 (40)	42 (33)	47 (31)	38 (36)	40 (37)	47 (32)	41 (34)	51 (29)
Belarus	68 (25)	71 (26)	63 (28)	56 (31)	40 (33)	48 (30)	56 (30)	53 (30)	53 (30)	48 (32)	48 (30)
Brunei Darussalam	43 (33)	38 (37)	29 (42)	42 (34)	53 (30)	49 (30)	47 (33)	44 (35)	54 (30)	55 (30)	61 (27)
Mauritius	48 (31)	60 (28)	72 (26)	72 (27)	64 (27)	50 (30)	64 (28)	62 (29)	50 (31)	53 (30)	44 (31)
Bosnia and Herzegovina	72 (24)	64 (27)	55 (31)	58 (30)	47 (31)	51 (30)	52 (30)	50 (31)	51 (31)	44 (33)	55 (28)
Romania	45 (32)	36 (37)	42 (36)	37 (36)	25 (39)	52 (29)	50 (30)	49 (32)	57 (30)	54 (30)	58 (27)
Argentina	51 (30)	70 (26)	91 (22)	85 (23)	97 (24)	53 (29)	54 (30)	73 (27)	55 (30)	60 (29)	42 (33)
Belize	50 (30)	61 (28)	74 (26)	67 (27)	57 (29)	54 (29)	49 (31)	61 (29)	61 (29)	77 (26)	52 (29)
Russian Federation	65 (25)	77 (25)	77 (25)	69 (27)	77 (26)	55 (29)	48 (32)	57 (30)	64 (28)	70 (27)	71 (26)
Albania	62 (27)	49 (32)	46 (34)	51 (31)	35 (34)	56 (29)	60 (29)	70 (28)	72 (26)	50 (31)	50 (30)
Namibia	55 (28)	75 (26)	64 (28)	68 (27)	73 (26)	57 (29)	66 (28)	67 (28)	76 (25)	78 (26)	59 (27)
Mexico	52 (30)	47 (32)	48 (34)	59 (29)	62 (28)	58 (28)	51 (30)	56 (30)	71 (27)	59 (29)	78 (25)
Bulgaria	71 (25)	80 (24)	89 (23)	66 (27)	50 (30)	59 (28)	61 (29)	60 (29)	66 (28)	62 (28)	49 (30)
Kuwait	58 (27)	44 (33)	32 (40)	35 (36)	44 (32)	60 (28)	59 (29)	58 (30)	52 (30)	66 (28)	86 (22)
Thailand	66 (25)	54 (29)	53 (32)	49 (32)	41 (33)	61 (28)	58 (29)	52 (30)	60 (29)	73 (27)	75 (25)
Cuba	53 (29)	72 (26)	80 (24)	60 (28)	85 (25)	62 (28)	63 (28)	64 (28)	40 (35)	42 (33)	36 (35)
Ecuador	63 (26)	63 (27)	97 (20)	86 (23)	106 (22)	63 (27)	67 (28)	72 (28)	69 (27)	67 (28)	76 (25)
Panama	70 (25)	65 (27)	62 (28)	73 (27)	72 (27)	64 (27)	57 (29)	63 (29)	67 (27)	64 (28)	74 (25)
Colombia	74 (24)	66 (27)	67 (27)	61 (28)	59 (28)	65 (27)	65 (28)	71 (28)	77 (25)	74 (27)	84 (22)
Lebanon	59 (27)	52 (31)	38 (37)	50 (32)	51 (30)	66 (27)	71 (26)	55 (30)	70 (27)	63 (28)	77 (25)
Costa Rica	60 (27)	59 (28)	65 (27)	63 (28)	69 (27)	67 (27)	62 (28)	68 (28)	62 (28)	57 (29)	69 (26)
Morocco	102 (19)	128 (14)	71 (27)	71 (27)	58 (28)	68 (27)	74 (26)	84 (24)	89 (22)	90 (22)	101 (20)
Kazakhstan	87 (21)	67 (27)	58 (30)	64 (28)	52 (30)	69 (26)	68 (27)	69 (28)	68 (27)	61 (29)	68 (26)
Dominican Republic	54 (29)	76 (26)	73 (26)	77 (26)	90 (24)	70 (26)	70 (26)	66 (28)	59 (29)	71 (27)	54 (28)
Tunisia	79 (23)	68 (26)	60 (29)	78 (26)	70 (27)	71 (26)	84 (24)	78 (26)	80 (25)	81 (25)	83 (23)

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Table II. 3: (continued)

Country	Rank 2000	Rank 2001	Rank 2002	Rank 2003	Rank 2004	Rank 2005	Rank 2006	Rank 2007	Rank 2008	Rank 2009	Rank 2010
Saudi Arabia	64 (25)	58 (28)	49 (34)	53 (31)	61 (28)	72 (25)	69 (26)	74 (27)	78 (25)	75 (27)	89 (22)
Venezuela, RB	75 (24)	69 (26)	68 (27)	89 (22)	113 (21)	73 (25)	80 (24)	75 (27)	73 (26)	69 (28)	79 (24)
El Salvador	92 (20)	83 (23)	88 (23)	80 (25)	96 (24)	74 (24)	73 (26)	82 (25)	81 (24)	84 (23)	95 (20)
Zambia	94 (20)	78 (24)	75 (26)	76 (26)	60 (28)	75 (24)	79 (24)	90 (22)	83 (24)	79 (25)	87 (22)
Georgia	110 (17)	91 (21)	83 (24)	83 (24)	71 (27)	76 (24)	53 (30)	65 (28)	63 (28)	68 (28)	60 (27)
Honduras	83 (21)	87 (22)	90 (23)	91 (21)	108 (22)	77 (24)	77 (25)	86 (23)	87 (22)	87 (23)	82 (23)
China	82 (21)	74 (26)	69 (27)	75 (26)	65 (27)	78 (24)	83 (24)	81 (25)	75 (25)	72 (27)	62 (27)
Macedonia, FYR	86 (21)	81 (24)	78 (25)	65 (28)	84 (25)	79 (23)	76 (25)	83 (24)	84 (24)	85 (23)	98 (20)
Oman	73 (24)	55 (29)	52 (32)	62 (28)	81 (25)	80 (23)	75 (25)	76 (27)	65 (28)	65 (28)	85 (22)
Armenia	107 (17)	89 (21)	84 (23)	79 (26)	88 (25)	81 (23)	72 (26)	77 (26)	79 (25)	76 (27)	72 (25)
Zimbabwe	67 (25)	73 (26)	82 (24)	82 (24)	95 (24)	82 (23)	87 (23)	99 (20)	103 (18)	108 (18)	96 (20)
Ukraine	91 (20)	101 (20)	115 (17)	88 (23)	105 (22)	83 (23)	92 (21)	91 (22)	88 (22)	106 (19)	100 (20)
Maldives	61 (27)	85 (22)	85 (23)	84 (23)	118 (20)	84 (23)	81 (24)	59 (29)	44 (35)	83 (24)	65 (27)
Malaysia	77 (24)	62 (27)	66 (27)	74 (27)	75 (26)	85 (23)	86 (23)	79 (26)	82 (24)	86 (23)	80 (24)
Botswana	76 (24)	82 (24)	56 (30)	70 (27)	68 (27)	86 (23)	85 (24)	80 (26)	74 (26)	80 (25)	73 (25)
Uruguay	56 (28)	57 (29)	76 (25)	52 (31)	86 (25)	87 (22)	82 (24)	51 (31)	48 (32)	46 (32)	41 (33)
Guatemala	90 (20)	79 (24)	70 (27)	81 (25)	74 (26)	88 (22)	89 (22)	88 (22)	90 (21)	91 (22)	104 (19)
Azerbaijan	120 (15)	112 (18)	100 (20)	105 (19)	114 (20)	89 (22)	78 (25)	85 (24)	86 (23)	56 (30)	56 (28)
Indonesia	96 (20)	110 (18)	98 (20)	87 (23)	79 (26)	90 (22)	95 (21)	87 (23)	91 (21)	94 (21)	99 (20)
Sri Lanka	69 (25)	92 (21)	110 (18)	99 (20)	99 (24)	91 (21)	96 (21)	100 (20)	96 (20)	92 (21)	63 (27)
South Africa	19 (47)	53 (31)	61 (29)	57 (30)	76 (26)	92 (21)	98 (20)	54 (30)	58 (29)	52 (31)	32 (38)
Nicaragua	80 (23)	86 (22)	103 (19)	106 (19)	109 (21)	93 (20)	90 (22)	96 (20)	101 (19)	98 (20)	91 (22)
Cambodia	100 (19)	103 (19)	101 (20)	94 (21)	87 (25)	94 (20)	94 (21)	93 (21)	94 (20)	95 (20)	97 (20)
Congo, Rep.	97 (19)	90 (21)	87 (23)	92 (21)	107 (22)	95 (20)	88 (22)	92 (22)	92 (20)	97 (20)	88 (22)
Vietnam	88 (21)	88 (22)	93 (22)	103 (20)	82 (25)	96 (20)	99 (20)	95 (21)	95 (20)	82 (24)	93 (21)
Mongolia	93 (20)	99 (20)	102 (20)	96 (21)	121 (19)	97 (20)	97 (20)	97 (20)	98 (20)	89 (22)	81 (23)
Nigeria	115 (16)	124 (15)	121 (15)	117 (17)	93 (24)	98 (20)	102 (19)	118 (15)	105 (18)	107 (18)	119 (16)
Philippines	118 (16)	120 (16)	112 (18)	97 (21)	83 (25)	99 (19)	91 (21)	101 (19)	106 (17)	101 (20)	105 (19)
Paraguay	114 (17)	93 (20)	95 (21)	93 (21)	104 (22)	100 (19)	107 (18)	98 (20)	93 (20)	104 (19)	90 (22)
Burkina Faso	89 (20)	96 (20)	99 (20)	95 (21)	54 (30)	101 (19)	105 (18)	119 (15)	107 (17)	100 (20)	108 (18)
Guyana	106 (18)	105 (19)	120 (15)	131 (14)	130 (17)	102 (19)	93 (21)	103 (19)	102 (19)	116 (17)	113 (17)
Tanzania	119 (15)	104 (19)	92 (22)	100 (20)	98 (24)	103 (19)	104 (18)	104 (18)	108 (17)	115 (17)	114 (17)
Moldova	103 (19)	100 (20)	105 (19)	107 (19)	103 (22)	104 (18)	120 (15)	117 (16)	111 (17)	103 (19)	67 (26)
Pakistan	137 (10)	123 (15)	128 (13)	125 (16)	78 (26)	105 (18)	117 (16)	116 (16)	122 (14)	127 (14)	128 (14)
Mozambique	132 (13)	119 (16)	104 (19)	110 (18)	111 (21)	106 (18)	112 (17)	108 (17)	112 (16)	118 (16)	130 (14)
Iran, Islamic Rep.	104 (18)	108 (18)	96 (21)	102 (20)	94 (24)	107 (18)	109 (17)	111 (16)	120 (15)	112 (17)	106 (18)
Lesotho	95 (20)	95 (20)	108 (19)	104 (19)	117 (20)	108 (18)	101 (19)	102 (19)	97 (20)	99 (20)	70 (26)
Papua New Guinea	124 (15)	97 (20)	79 (25)	101 (20)	100 (23)	109 (18)	106 (18)	113 (16)	118 (15)	119 (15)	131 (14)
Cameroon	85 (21)	84 (23)	81 (24)	90 (22)	101 (23)	110 (17)	116 (17)	121 (14)	123 (14)	117 (16)	115 (17)
Peru	98 (19)	117 (16)	122 (15)	120 (16)	137 (16)	111 (17)	100 (19)	105 (18)	99 (19)	96 (20)	92 (22)
Jordan	84 (21)	109 (18)	119 (16)	111 (18)	127 (18)	112 (17)	103 (19)	89 (22)	85 (23)	88 (22)	94 (21)
Cote d'Ivoire	111 (17)	107 (19)	111 (18)	123 (16)	110 (21)	113 (17)	108 (18)	126 (13)	126 (12)	132 (12)	134 (11)
Uzbekistan	125 (15)	129 (14)	130 (12)	112 (18)	112 (21)	114 (17)	124 (15)	115 (16)	109 (17)	102 (20)	109 (17)
Yemen, Rep.	131 (13)	111 (18)	109 (18)	115 (17)	124 (19)	115 (17)	119 (16)	112 (16)	117 (15)	121 (15)	129 (14)
Algeria	101 (19)	98 (20)	94 (21)	109 (18)	125 (19)	116 (17)	111 (17)	106 (18)	114 (16)	111 (17)	110 (17)
Malawi	135 (12)	136 (10)	139 (7)	139 (10)	129 (17)	117 (16)	125 (15)	131 (11)	131 (12)	136 (10)	133 (11)
Madagascar	129 (14)	122 (15)	116 (16)	113 (18)	89 (25)	118 (16)	118 (16)	110 (17)	115 (16)	130 (13)	136 (10)
Egypt, Arab Rep.	105 (18)	118 (16)	114 (17)	122 (16)	136 (16)	119 (16)	126 (14)	107 (17)	119 (15)	110 (18)	102 (20)
Turkmenistan	112 (17)	94 (20)	86 (23)	108 (19)	128 (18)	120 (16)	115 (17)	94 (21)	100 (19)	93 (21)	103 (20)
India	99 (19)	102 (19)	107 (19)	98 (20)	66 (27)	121 (16)	110 (17)	109 (17)	110 (17)	105 (19)	117 (16)
Uganda	123 (15)	131 (13)	127 (13)	129 (15)	119 (20)	122 (16)	122 (15)	128 (12)	125 (12)	114 (17)	116 (17)
Ghana	127 (14)	125 (15)	123 (14)	114 (17)	123 (19)	123 (15)	113 (17)	123 (13)	121 (14)	128 (14)	127 (14)
Senegal	121 (15)	121 (16)	133 (12)	132 (13)	102 (23)	124 (15)	128 (14)	122 (13)	116 (15)	129 (13)	120 (16)
Bangladesh	108 (17)	116 (16)	126 (14)	116 (17)	91 (24)	125 (15)	121 (15)	120 (15)	113 (16)	109 (18)	112 (17)
Chad	142 (7)	140 (7)	138 (8)	141 (10)	132 (17)	126 (14)	139 (11)	139 (8)	139 (10)	140 (7)	139 (8)
Bolivia	116 (16)	113 (17)	113 (17)	127 (16)	139 (16)	127 (14)	114 (17)	114 (16)	104 (18)	113 (17)	118 (16)
Benin	113 (17)	126 (15)	131 (12)	128 (15)	115 (20)	128 (14)	135 (13)	133 (11)	124 (13)	131 (13)	122 (15)
Kyrgyz Republic	126 (14)	127 (14)	129 (13)	126 (16)	122 (19)	129 (14)	132 (13)	132 (11)	128 (12)	122 (15)	124 (15)
Gambia, The	136 (11)	135 (11)	135 (11)	135 (12)	140 (16)	130 (14)	138 (12)	137 (10)	134 (11)	138 (9)	138 (8)
Tajikistan	133 (12)	138 (8)	137 (10)	130 (14)	120 (19)	131 (14)	130 (14)	127 (12)	133 (11)	124 (14)	107 (18)
Kenya	117 (16)	114 (17)	117 (16)	119 (16)	92 (24)	132 (13)	131 (13)	124 (13)	129 (12)	120 (15)	111 (17)
Mali	134 (12)	133 (13)	134 (12)	124 (16)	133 (16)	133 (13)	127 (14)	136 (10)	135 (11)	137 (10)	137 (9)
Nepal	128 (14)	130 (14)	132 (12)	118 (16)	80 (25)	134 (13)	137 (12)	138 (9)	138 (10)	134 (12)	135 (10)
Syrian Arab Republic	109 (17)	115 (16)	106 (19)	121 (16)	131 (17)	135 (13)	134 (13)	125 (13)	127 (12)	125 (14)	125 (15)
Iraq	81 (22)	106 (19)	118 (16)	136 (12)	141 (14)	136 (13)	123 (15)	130 (12)	132 (12)	126 (14)	123 (15)
Sudan	130 (14)	134 (12)	124 (14)	133 (13)	138 (16)	137 (13)	129 (14)	134 (11)	136 (10)	133 (12)	126 (14)
Sierra Leone	122 (15)	132 (13)	125 (14)	134 (13)	126 (19)	138 (13)	133 (13)	129 (12)	130 (12)	123 (14)	121 (16)
Ethiopia	140 (8)	137 (10)	136 (10)	137 (11)	116 (20)	139 (13)	136 (13)	135 (10)	137 (10)	135 (11)	132 (12)
Niger	138 (9)	139 (7)	140 (6)	140 (10)	134 (16)	140 (8)	141 (9)	141 (5)	141 (8)	142 (5)	141 (7)
Burundi	141 (8)	141 (7)	142 (5)	138 (10)	135 (16)	141 (8)	142 (4)	142 (1)	142 (4)	139 (8)	142 (5)
Liberia	139 (8)	142 (6)	141 (5)	142 (6)	142 (4)	142 (6)	140 (10)	140 (8)	140 (9)	141 (6)	140 (7)

In 2000, overall only 4 non-OECD countries are located in the top 30. These are the Bahamas, Malta, Trinidad and Tobago and Gabon. Again looking at the information available from the U.S. TIP reports (e.g., United States, 2001), this is not extraordinary. Malta is reported as being a destination for women and girls exploitation in prostitution. Furthermore, its restaurant sector is known for exploiting men. Malta still ranks in the top 30 in 2005, but in 2010 its rank lowered to 39 indicating a decrease in the extent of human trafficking until 2010. Malta is also a destination country for many African migrants aiming to enter Europe who are vulnerable to human trafficking in the informal sectors of the Maltese economy (United States, 2010). The Bahamas rank very high in the trafficking index throughout the ten years (among the top 30 countries in all years apart from 2004 when it ranks 37). A likely reason is The Bahamas' status as a destination country for many migrants of other Caribbean countries who seek better economic conditions and who are consequently vulnerable to exploitation. With the lowest unemployment statistics in the region these are promising conditions for many migrants (IOM, 2010). The country is also known to be a destination and transit country for victims trafficked to Europe and Northern America (United States, 2010). Additionally, the government of the Bahamas only ratified the Palermo Protocol in 2008 (United Nations, 2013), which indicates potentially lower efforts to fight human trafficking in the beginning of the research period. All of these aspects together explain the high ranking of the country, and thus the high magnitude of HT into the country.

Trinidad and Tobago has been evaluated by the U.S. Department of State in its TIP report since 2009. According to the investigation the country is known to be a destination and transit country where female victims are exploited in the commercial sex and forced labor industries and men are exploited on construction sites and other low skilled activities such as fishing (United States, 2012). Trafficking is a lucrative business in the country, which makes it an attractive destination country for traffickers. According to the intensity measure, the level of HT increased and in 2010 Trinidad and Tobago ranks among the top 20 destination countries.

In the case of Gabon, the only African country ranking among the top 30 countries in 2005, the trafficking problem is large in magnitude because of many children being trafficked into the country. Traffickers buy children from their parents with the promise

of better living conditions. However, they are trafficked and exploited in their destination country (United States, 2009). Gabon is seen as one of the most prosperous in the region, with more opportunities for work (United Nations, 2012). This might explain the high position of the country in the index.

Looking at some major OECD countries, the United States – as the state pushing initiatives against human trafficking such as the implementation of anti-trafficking instruments – ranks between 10 (2004) and 17 (2000). In the last two years they rank 16 and 15, which suggests that they are a destination country for victims of exploitation. This relatively constant position suggests that despite the United States' intense anti-trafficking efforts and awareness campaigns run locally and internationally, the magnitude of the problem within its borders seems to be quite stable.

According to our ranking, human trafficking is most prevalent in the United Kingdom (UK). It is the top ranked country for five of the ten years and except for 2000 to 2002 it holds the second position. Taking into account that the UK is traditionally an immigration country, where many international migrants seek better living conditions, all forms of exploitation are identified in the country. Illegal drug cultivation and smuggling as well as exploitation in low skilled jobs together with lax law enforcement in parts of the country support our findings (United States, 2010). Finally, Germany and the Netherlands rank among the top ten countries throughout the years supporting reports of a high magnitude of HT in these countries. On the lower end of the list are mainly Sub-Saharan African countries. These are mainly low-income countries that act as a source rather than a destination for victims of human trafficking.

Relevance of the index

Testing the properties and the relevance of our intensity measure we apply several verifications. Looking at Table II. 4 we find the index to be satisfactorily correlated with other relevant measures. The intensity index (HT intensity) is positively correlated with the tier rank of the U.S. State Department with a Spearman rank correlation of 0.69. This is in line with expectations, given that high values of the tier rank indicate compliance with the Victims of Trafficking and Violence Protection Act (TVPA). Presumably the problem in the country is more intense with stricter legal measures.

Table II. 4: Pair -wise correlations between indices

	HT inflow	Tier rank	CI: destination	CI: origin
HT intensity	1			
Tier rank	0.500	1		
CI: destination	0.504	0.294	1	
CI: origin	-0.369	-0.166	-0.124	1

Notes: The tier rank is reversed and shows higher values the better countries fulfill the TVPA standards. CI: destination/origin stands for the citation index compiled by the UNODC. The countries are ranked in a five-category scale with the highest value indicating that the probability of being a destination/origin country is very high.

The citation index (CI) is developed in the 2006 Global Report on Trafficking. These are three measures of human trafficking in destination, transit and countries of origin (UNODC, 2006). The country classification is based on open source information and is only available in 2006 based on information for the years 1995-2003. Looking at the UNODC citation indices, again a positive correlation exists with the constructed HT index. Countries with a high citation index value (destination countries) also have a larger value in our ranking. Likewise, the negative and significant correlation with citation as origin countries displays the expected correlation. One could argue that the correlation between the indices is only modest (0.50 to 0.37, respectively). However, this can be attributed to the different aspects of human trafficking that they measure. The tier rank addresses compliance with the TVPA and thus political decisions on fighting human trafficking. This is only one aspect of the process of trafficking in human beings, which is a partial aspect of our intensity index. The latter also captures country characteristics as well as the criminal dimension and vulnerability of victims. The same holds true for the citation indices. Both measures are based on and capture human trafficking visible to society that receives public awareness. By including identified victims as well as the other indicators in our measurement this aspect of the trafficking process is included in the intensity index together with the causes. Although these correlations only provide descriptive evidence, it is a reassuring signal for the adequacy of the measurement developed in this paper.

Finally, we show that the HT intensity index really captures human trafficking. Given that with the ratification of the Palermo Protocol governments set themselves the goal of rigorously fighting human trafficking and implementing instruments against the

international criminal activity, we would expect that human trafficking decreases following its ratification. In Table II. 5 we provide first evidence that this is indeed the case for our measure of HT intensity. The table shows the results for the test of ratification in a specific year, measured by a dummy variable (year of ratification) on the extent of HT measure. We control for rule of law taken from the World Bank Governance Indicators (Kaufmann et al., 2010), ranging from -2.5 to 2.5, with higher values corresponding to better outcomes. We also include measures of (log) income per capita and (log) population from the World Bank's World Development Indicators (2012) and a dummy indicating democratic governments (Cheibub et al., 2010).⁸² All controls are lagged by one year.

Table II. 5: HT intensity and Palermo Protocol ratification

	FE	RE	DC
Year of ratification	-0.490 (1.174)	-0.499 (1.233)	-0.490 (1.264)
Rule of Law	-0.513 (0.600)	2.528*** (4.265)	-0.513* (1.812)
Population	-8.955*** (4.881)	0.214 (0.793)	-8.955*** (11.562)
(log) GDP pc	4.456*** (4.319)	5.955*** (13.708)	4.456*** (8.274)
Democracy	-0.853 (0.981)	0.305 (0.386)	-0.853 (1.647)
# of Observations	1136	1136	1136
# of Countries	142	142	142
R-squared (within)	0.042	0.011	0.042
Hausman test (p-value)	0.000		

Notes: t-statistics in parenthesis. FE = fixed-effects regression with clustered standard errors on the country level. RE = random-effects regression with cluster robust standard errors, DC = fixed-effects with Driscoll-Kraay (1998) cross-sectional dependence adjusted standard errors; Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

We use three panel model estimators: fixed-effects with clustered standard errors, random effects, and fixed-effects with Driscoll-Kraay (1998) cross-sectional dependence adjusted standard errors. The Hausman-test clearly indicates that the fixed-effects

⁸² We take the controls suggested by Cho et al. (2013). We do not control for migration, because the number of observations decreases to one fourth.

estimator is preferred. The controls are according to expectations: larger countries experience relatively less human trafficking, and richer countries are more prone to trafficking, *ceteris paribus*. Both variables are significant at the 1 percent level. Democracies seem to have a lower intensity of human trafficking and better rule of law reduces HT as well. Our variable of interest is the year of ratification. The dummy is negative indicating that after the ratification of the Palermo Protocol the extent of human trafficking reduces. Although the latter is not statistically significant at conventional levels, it points in the right direction, regardless of the method used. We are aware of the fact that they should be interpreted with care. However, a more in depth analysis of these aspects in future research will provide further evidence. We are confident that we are able to show the relevance and strength of the HT intensity index and the value of the approach taken.

II. 5 CONCLUSION

In summary, this paper is the first study that uses a structural equation model in a holistic approach to measure human trafficking. Both causes and indicators of human trafficking intensity in destination countries are included and thus the clandestine nature of the phenomenon is addressed. MIMIC models are special cases of structural equation models combining a structural model and a measurement model. This empirical instrument provides both estimates of the correlation between determinants of HT as well as estimates on the relationship between human trafficking and its consequences in destination countries. From these results, a yearly index on the intensity of human trafficking in destination countries is constructed for the 2000-2010 period considering 142 countries around the world.

Our approach goes beyond existing studies including causal factors and indicators together acknowledging the illicit nature of the phenomenon. The causes mirror the incentive structure for traffickers by taking into account their chances of making high profits while having a low probability of detection. Furthermore, the causes also capture the vulnerability of trafficking victims by addressing their incentives to move in the first place from which point they are vulnerable to false promises of better opportunities. By travelling from a poorer country to a wealthier one individuals are inherently vulnerable

– this is the case especially as they seem not to move to linguistically fractionalized countries. The indicators, on the other hand, show the outcomes for countries of illegal trafficking of human beings into their borders. Human trafficking induces a higher crime level in destination countries with, e.g., a larger underground economy. The number of identified victims is a partial indicator of the phenomenon and specifies the visible extent of the problem. The dimensions of the fight against HT are captured by the 3P-index. The measure quantifies the application of anti-trafficking policies within countries, which arguably is a consequence of the intensity of the phenomenon.

The developed measure of HT intensity in destination countries identifies the development of HT over time and across a large set of countries. It is the first measure to quantify illegal trafficking of humans in these countries. The pattern of the development of human trafficking over the observed period is in line with expectations. Developed countries are highly ranked and observe a large amount of trafficking within their borders. These countries are the primary targets of traffickers, supposedly because the potential for large profits is greatest in wealthier countries. The lowest ranking countries are the countries in Sub-Saharan Africa, whose status as a source for victims of trafficking explains this position. Asian countries are in the middle range although evidence of trafficking within this region (e.g., due to the missing women phenomenon) is varied.

Researchers and policy makers alike may use this numerical evaluation of human trafficking to respond more adequately to the issue of trafficking in persons. To date, this information was lacking. The information provided by our new human trafficking intensity measure fills this knowledge gap. We provide researchers with a measure of the intensity of HT over time that allows for an in depth analysis of related aspects. This will support further research on the consequences of trafficking in persons and increase the toolbox of policy makers to understand and combat human trafficking. In particular, the relationship between human trafficking inflows and its auxiliary aspects can be analyzed in more detail, giving a better understanding of the intensity of victim exploitation and inflows. Studies that leveraged situations in countries with the existence of human trafficking such as ethnic fractionalization, conflict or displaced populations could further profit from an analysis of the intensity of human trafficking rather than only looking at its existence measured by binary variables. Using the MIMIC approach

also provides the possibility to assess human trafficking in a social context and investigate its relationship with labor market reforms in destination countries. Similarly, the effect of migration legislation on human trafficking inflows is an important factor for policy analysts to consider in the fight against HT. Investigating these interrelations will enhance understanding of the crime and help in designing counter-measures to control human trafficking in developed and developing countries alike.

Some final qualifications are in order. First, the MIMIC method is a repeated cross section method that does not allow us to use country-specific intercepts in the regression analysis. However, by scaling the index between 1 and 100 (1 shows low intensity and 100 a high intensity) over the whole period we are able to compare the development of the extent of human trafficking over time and between countries. Second, potential endogeneity between the variables is not rigorously addressed. Taking lags of the causal variables mitigates the problem, but does not eliminate it. Finally, it remains unclear what the extent of human trafficking ultimately includes. Therefore, a decrease in the intensity of HT made visible by our index shows the reduction of criminal activity in total, but not which aspect specifically (trafficker, victims, legal system) or in what kind of exploitation (i.e., sexual or labor exploitation).

In terms of policy implications, policy makers as well as practitioners alike may use this numerical assessment of human trafficking to see positions of countries relative to other countries and further understand the problem within their respective national borders. We estimate a country specific measure, one should keep in mind that human trafficking is a transnational problem and that the fight against this crime is best fought at both ends of the trafficking route – in destination and source countries. Additionally, the allocation of resources on the supranational level, i.e., to Interpol or other international organizations might be best suited to address and fight international human trafficking.

APPENDIX II.A

Table A II. 1: Overview of hypotheses

Hypotheses	Independent Variables	Theoretical expected sign	Hypotheses confirmed	Statistical significance
H1	A large extent of human trafficking in a country leads to a high number of identified victims, <i>ceteris paribus</i> .	Number of victims (per 100,000 people)	+	
H2	The larger the scale of HT in a country the more intense the fight against this crime, <i>ceteris paribus</i> .	3P-anti trafficking index	+	√ ***
H3	The more HT takes place in a country the higher the crime rate, <i>ceteris paribus</i> .	Crime rate (per 100,000 people)	+	√ ***
H4	The richer the country, the larger is the extent of HT, <i>ceteris paribus</i> .	GDP per capita	+	√ ***
H5	The larger the demand for low-skilled services where exploitation takes place the higher the prevalence of HT in the country, <i>ceteris paribus</i> .	Employment in agriculture as share of total employment	+	√ **
H6	International investment connectedness increases HT presence in the country, <i>ceteris paribus</i> .	FDI stock as share of GDP	+	√ ***
H7	HT is increased by factors that force migration and attract people to a specific (rich) country, <i>ceteris paribus</i> .	Information flow	+	√ *
		Tourism arrivals (per 100,000 people)	+	
		Linguistic fractionalization (DELF)	-	
		Migrants (share in population)	+	
		Size of population	+	
H8	Crime activities also have causal effects on HT, <i>ceteris paribus</i> .	Refugees (per 100,000 people)	+	√ ***
		Heroin seized (kg per 100,000 people)	+	
		Drug trafficking offences (per 100,000 people)	+	

Notes: Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

Table A II. 1 shows the theoretically expected signs of our eight hypotheses and all independent variables. For example, a high crime rate in a country is the result of high human trafficking in these countries, *ceteris paribus*. Or, traditional crime activities have a positive effect on HT, *ceteris paribus*, with the expected positive sign and the independent variable “drug trafficking offences share” being highly statistically significant.

Table A II. 2: MIMIC estimates (ML)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Structural model (log) GDP per capita	0.989*** (5.109)	0.910*** (4.336)	1.037*** (5.488)	0.994*** (5.388)	1.296*** (7.493)	1.118*** (5.967)	0.988*** (5.107)	1.010*** (5.222)	1.002*** (4.179)	0.849*** (3.973)	1.334*** (5.755)
(log) FDI share	0.118 (1.087)	0.046 (0.346)	0.127 (1.189)	0.205* (1.805)	0.066 (0.720)	0.180* (1.690)	0.126 (1.151)	0.134 (1.224)	0.030 (0.247)	0.134 (1.225)	0.071 (0.608)
Employment in agriculture	0.294 (1.370)	0.384* (1.662)	0.373* (1.756)	0.298 (1.454)	0.465*** (2.647)	0.322 (1.597)	0.305 (1.417)	0.316 (1.474)	0.322 (1.184)	0.204 (0.890)	0.392 (1.613)
Info flow		0.212 (0.906)									
Language fractionalization			-0.165* (1.692)								0.048 (0.399)
(log) Population				0.194** (2.076)							-0.034 (0.287)
International migrants					-0.417*** (5.237)						-0.372*** (2.767)
Tourism arrivals						-0.251*** (2.632)					-0.264* (1.796)
Refugees							-0.103 (0.526)				
Share of victims								-0.078 (0.946)			
Drug trafficking offences									0.258*** (2.777)		0.192** (2.322)
Heroin seizures										-0.046 (0.618)	
Measurement model (indicators)	1 (6.612)	1 (6.310)	1 (6.839)	1 (6.914)	1 (7.863)	1 (7.097)	1 (6.586)	1 (6.646)	1 (6.989)	1 (6.313)	1 (7.608)
Crime rate	0.601*** (6.612)	0.639*** (6.310)	0.632*** (6.839)	0.644*** (6.914)	0.736*** (7.863)	0.648*** (7.097)	0.598*** (6.586)	0.605*** (6.646)	0.617*** (6.989)	0.761*** (6.313)	0.654*** (7.608)
Overall 3P-index	0.042 (0.358)	0.051 (0.415)	0.045 (0.377)	0.033 (0.269)	0.021 (0.162)	0.042 (0.342)	0.041 (0.355)	0.041 (0.355)	-0.024 (0.160)	0.090 (0.539)	-0.047 (0.307)
Share of victims	84	84	84	84	84	84	84	84	60	53	60
Number of countries	84	84	84	84	84	84	84	84	60	53	60
Chi-square	9.66	23.06	12.82	21.40	20.36	13.82	9.94	5.04	9.12	8.58	16.12
(P-value)	0.14	0.00	0.12	0.01	0.01	0.09	0.27	0.17	0.33	0.38	0.44
RMSEA	0.09	0.15	0.08	0.14	0.14	0.09	0.05	0.09	0.05	0.04	0.01
Probability RMSEA<0.05	0.24	0.01	0.22	0.02	0.03	0.18	0.41	0.25	0.44	0.48	0.60
CFI	0.97	0.88	0.96	0.89	0.91	0.95	0.98	0.98	0.99	0.99	1.00
TLI	0.93	0.77	0.92	0.79	0.83	0.91	0.97	0.94	0.98	0.99	1.00
CD	0.54	0.57	0.58	0.60	0.74	0.62	0.54	0.55	0.68	0.65	0.80

Notes: Absolute z-statistics in parenthesis, *** p<0.01, ** p<0.05, * p<0.1, Fit indicators are described in the text.

Table A II. 3: Data and sources

Variables	Description	Sources
(log) GDP per capita	GDP per capita in constant US\$ (2005)	World Bank (2012)
(log) FDI stock share	Inward and outward FDI stock as percentage of GDP	UNCTAD (2012)
(log) Population	Total population per country per year	World Bank (2012)
Employment in agriculture (percent of total)	Share of employment in agriculture as percentage of total employment	World Bank (2012)
International migrants (share)	Number of (officially registered) international migrants in the country as share of total population	World Bank (2012)
Refugees by country of origin	Number of (officially registered) refugees in the country per 100,000 of local population	World Bank (2012)
East Asia and the Pacific (region dummy)	Dummy indicating countries lying in East Asia and the Pacific region according to the World Bank	World Bank (2012)
International tourism arrivals (share)	International tourists arriving in countries per year in 100,000 per local population	World Bank (2012)
Information flow (KOF Social Globalization)	Sub-components of the KOF globalization index including telecommunication as well as access to internet and newspaper proliferation. 0-100, larger values indicating more information availability	Dreher et al. (2008) Version: 2013
Linguistic fractionalization	Linguistic fractionalization in countries as part of the distance adjusted ethno-linguistic fractionalization index (DELFI); 0-1, larger values indicating larger linguistic dissimilarities	Kolo (2012), Alesina et al. (2003)
Heroin seizure	Amount of heroin seized per year in kg	United Nations (2008) CTS Database
Police personnel	Number of police personnel active in the country per 100,000 people	United Nations (2008) CTS Database
Crime rate	Crime rate in the country per 100,000 people	United Nations (2008) CTS Database
Drug trafficking	Drug trafficking offences per 100,000 people	United Nations (2008) CTS Database
OECD membership	Dummy for OECD countries	OECD (2012)
Victims	Number of identified human trafficking victims in destination countries coded by the UNODC in their <i>Global Report on Trafficking in Persons</i>	UNODC (2009, 2012)
CI: destination	Citation index of destination countries coded by the UNODC using open source information. Lower values indicating a larger probability to be a destination country	UNODC (2006)
CI: origin	Citation index of countries of origin coded by the UNODC using open source information. Lower values indicating a larger probability to be a country of origin	UNODC (2006)
3P-anti-trafficking index (prosecution, protection, prevention)	Anti-trafficking policy index which shows the application of anti-trafficking instruments in countries; 3-15, larger values indicating more compliance; Sub-components are the policy instruments applicable ranging from 1-5	Cho et al. (2014)
Democracy	Indicates whether multiple parties are legally allowed and exist outside the regime front, and whether the selection of the executive and the legislature involve either a direct or indirect mandate from an electorate.	Cheibub et al. (2010)
Rule of Law	Index in the range of -2.5 to 2.5, with higher values corresponding to better outcomes.	Kaufmann et al. (2010)

APPENDIX II. B:

FORMAL MODEL (DETAILED)

Jöreskog and Goldberger (1975) developed the formal specification of the approach for one latent variable. It encompasses a system of two equations: First, showing how the unobservable variable in the measurement equation model determines the examined endogenous variables; and second how the latent variable and its causes interact. Thus, the model is formally characterized in the following way. The independent indicators are y_i ($i = 1, \dots, m$) and η is the latent variable (i.e., human trafficking) such that:

$$y_i = \beta_i \eta + \varepsilon_i \quad (\text{II. A1})$$

The $1 \times m$ parameter vector $\beta_i = \{\beta_1, \beta_2, \dots, \beta_m\}'$ embodies the coefficients which indicate the estimated alteration in the respective indicators after a one unit change in the latent variable. The error terms $\varepsilon_i, i = 1, \dots, m$ have mean zero and covariance matrix θ_ε . The correlation across indicators is exclusively determined by the common factor η . Equation (1) is a confirmatory factor analysis model for the observable indicators $y = (y_1, y_2, \dots, y_m)'$ including the common factor η and the unique factor ε_i . In the covariance matrix θ_ε , the diagonal elements are represented in the $1 \times m$ vector τ .

Moreover, the latent unobservable variable η can be linearly decomposed in the following way:

$$\eta = \alpha' x + \omega, \quad (\text{II. A2})$$

where $\alpha = (\alpha_1, \alpha_2, \dots, \alpha_s)'$ are parameters, $x = (x_1, x_2, \dots, x_s)'$ is the vector of observable exogenous causal variables and a stochastic error term ω . The model described in equation (1) is also called a measurement model of the observed endogenous indicators determined by the latent variable. Any correlation between the elements of y results from the association with η . The indicators are assumed to be partially independent between all indicator pairs i and j setting all diagonal elements of θ_ε equal to zero. The second component of the model is a structural equation (2) that characterizes the relationship between the latent variable and its causes.

The structural parameters α are not directly estimable due to the latent nature of the objective variable. Therefore equation (1) is inserted in equation (2) in order to derive

the reduced form which connects the observable variables from (1) and (2) via the equation

$$\mathbf{y} = \mathbf{\Pi}'\mathbf{x} + \boldsymbol{\gamma}. \quad (\text{II. A3})$$

This is a multivariate regression model, which includes the endogenous indicators $\mathbf{y} = (y_1 \dots y_n)'$ and the exogenous causes $\mathbf{x} = (x_1, x_2, \dots, x_s)'$ of the latent factors η . The reduced form coefficient matrix has the rank $(m \times s) = 1$ and is given by $\mathbf{\Pi} = \boldsymbol{\alpha}\boldsymbol{\beta}'$. The $(1 \times m)$ reduced form disturbance vector reads as $\boldsymbol{\gamma} = \boldsymbol{\beta}\boldsymbol{\omega} + \boldsymbol{\varepsilon}$ and has the error covariance matrix

$$\Theta_{\omega} = E[(\boldsymbol{\beta}\boldsymbol{\omega} + \boldsymbol{\varepsilon})(\boldsymbol{\beta}\boldsymbol{\omega} + \boldsymbol{\varepsilon})'] = \sigma_{\omega}^2\boldsymbol{\beta}\boldsymbol{\beta}' + \Theta_{\varepsilon}. \quad (\text{II. A4})$$

The variance (σ_{ω}^2) of the stochastic error term ω has the characteristic structure of the covariance matrix of a factor analysis model. This error covariance matrix is constrained similarly to $\mathbf{\Pi}$, because it is the sum of a one-rank matrix and a diagonal matrix. Therefore one of the elements of the factor loading vector $\boldsymbol{\beta}$ has to be constrained in order to identify the model (Bollen 1989).⁸³ The choice of which indicator is normalized determines the scale of the latent variable, but it does not affect the results of the measurement. We follow the literature and use the indicator with the largest factor loading (Bollen, 1989).

Accordingly, the estimation procedure and the identification of the model are derived by relations of the observable data, $\mathbf{z} = (\mathbf{y}'\mathbf{x}')'$. The $(m + s) \times (m + s)$ covariance of the underlying model defined by equations (1) and (2) shows the relationship in terms of their respective covariance

$$\Sigma(\boldsymbol{\varphi}) = \begin{bmatrix} \boldsymbol{\beta}(a'\boldsymbol{\phi}_x\boldsymbol{\alpha} + \sigma_{\omega}^2)\boldsymbol{\beta}' + \Theta_{\varepsilon} & \boldsymbol{\beta}\boldsymbol{\alpha}'\boldsymbol{\phi}_x \\ \boldsymbol{\phi}_x a'\boldsymbol{\beta} & \boldsymbol{\phi}_x \end{bmatrix}. \quad (\text{II. A5})$$

Where $\boldsymbol{\varphi}$ is the vector of independent but correlated parameters $\boldsymbol{\beta}$, a , Θ_{ε} and σ_{ω}^2 . The elements on the main-diagonal are $E[\mathbf{y}\mathbf{y}'] = \boldsymbol{\beta}(a'\boldsymbol{\phi}_x\boldsymbol{\alpha} + \sigma_{\omega}^2)\boldsymbol{\beta}' + \Theta_{\varepsilon}$ and $E[\mathbf{x}\mathbf{x}'] = \boldsymbol{\phi}_x$ and the off-diagonal components are $E[\mathbf{x}\mathbf{y}'] = \boldsymbol{\beta} a'E[\mathbf{x}\mathbf{x}']$. Applying this information for the population, parameters are derived resulting in an estimate of the best approximation of

⁸³ Following the literature (e.g., Dreher et al., 2007 and Buehn and Farzanegan, 2012) this approach is used here where one of the coefficients of the coefficient vector $\boldsymbol{\beta}$ is fixed to an a priori value, such that the unit of measurement for the unobserved term is normalized relative to one of the indicator variables. Another possibility is applied mainly in factor analysis where the latent variable is standardized to have unit variance (e.g., Di Tommaso et al., 2009).

the sample covariance matrix of the observed causes and indicators, $\widehat{\Sigma} = \Sigma(\hat{\varphi})$. This pattern is driven by the unobservable variable.

Given (5), identification depends on the information in the matrix and whether it is sufficient to provide a unique set of values in φ . The set of mean parameters will then be identified if $q - p \geq 0$, with $q = ms$ observable moments in terms of structural parameters and $p = m + s$, which is shaped by the off-diagonal elements. If this condition holds, the remaining parameters on the diagonal will be identified. In combination this implies that the necessary condition for identification of all parameters is given by

$$p \leq \frac{1}{2}(m + s)(m + s + 1). \quad (\text{II. A6})$$

Estimation of $\Sigma(\varphi)$, $\widehat{\Sigma} = \Sigma(\hat{\varphi})$ is obtained if the parameter and covariance values are chosen in such a way that the difference between the estimate and the true sample covariance \mathbf{S} of the causes and indicators is minimized using the following objective function:

$$F = \ln|\Sigma(\varphi)| + \text{tr}[\mathbf{S}\Sigma^{-1}(\hat{\varphi})] - \ln|\mathbf{S}| - (m + s), \quad (\text{II. A7})$$

which is a likelihood function assuming a multivariate normal distribution.⁸⁴ The sufficient rule for the MIMIC model to be identified is $m \geq 2$ and $s \geq 1$ (Bollen, 1989: 331). Perfect fit would be achieved if the true sample covariance is equal to the estimated covariance, $\mathbf{S} = \Sigma(\hat{\varphi})$. This is evaluated using several indices specified below.

After identification of the relationship between the variables and the estimation of the parameters, the latent scores of η for each country can be specified assigning factor scores using the mean vector and variance matrix of the fitted model. This method was suggested by Jöreskog (2000) and uses more structural information than a simple linear application.⁸⁵ For this reason the factor score is used for the generation of the final country ranking. The factor score is generated in the following way:

$$\tilde{\eta} = \widehat{\Sigma}'_{z\eta} \widehat{\Sigma}_{zz}^{-1} \hat{\mu}_z + \hat{\mu}_\eta \quad (\text{II. A8})$$

⁸⁴ The maximum likelihood estimator with missing values (mlmv) is implemented into STATA's sem command in order to account for the missing values in the observable data (Jöreskog, 1973). Since the maximization of the log likelihood does not depend on the complete information of individuals the estimator also considers all partially complete data in the estimation process. This procedure is similar to multiple imputations and provides unbiased estimates (Baraldis and Enders, 2010).

⁸⁵ The linear prediction is specified as well and gives similar results with a rank correlation of larger than 85 percent.

with $z = (y'x)'$ being the vector of all observable causes and indicators from equation (3), $Z = (z'\eta)'$ the vector of all variables of the model, $\hat{\mu}_Z = \hat{\mu}_z\hat{\mu}_\eta$ the fitted mean of Z , and $\hat{\Sigma}_Z = \begin{pmatrix} \hat{\Sigma}_{zz} & \hat{\Sigma}_{z\eta} \\ \hat{\Sigma}'_{z\eta} & \hat{\Sigma}_{\eta\eta} \end{pmatrix}$ the fitted variance. Thus, the factor score is the fitted mean prediction of the latent variable, similar to prediction of the dependent variable in regression models, weighted by minimizing the objective function (7). The score of the latent variable is subsequently obtained by implementing these weights, the estimated coefficients of the measurement, and the structural model in equation (8). This said, the model is applied to measure the extent of human trafficking in destination countries.



CHAPTER III

**PENSION PROGRAMS AROUND THE WORLD:
DETERMINANTS OF SOCIAL PENSION ADOPTION**

Keywords: Public pension, demographic change, old-age poverty, political economy, panel data

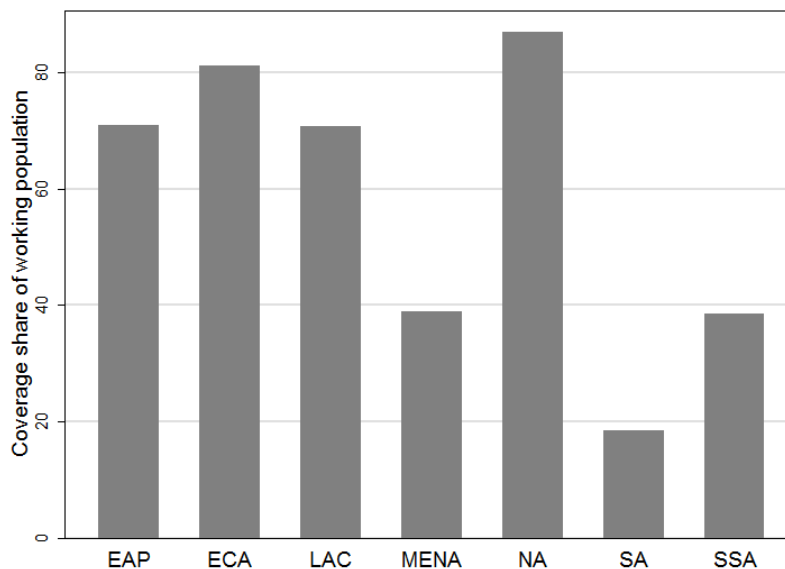
JEL classification: H55, J14, I38

Acknowledgment: I would like to thank Jan Priebe for his support in this project.

III. 1. INTRODUCTION

Population growth, decreasing fertility rates and improvements in life expectancy in many countries around the world have contributed to a substantial rise in the world's share of elderly population. In line with this general trend, the total size of the global population above 60 years is expected to increase further and reach 2 billion by 2050 in absolute terms (United Nations, 2014). Given the past and expected future increase in the elderly population, many countries in the world have introduced reforms to their pension systems with the double goal of mitigating old-age poverty and ensuring the financial viability of the system. Despite reforms, until today the majority of elderly people in the world, especially in developing countries, are either not at all or only insufficiently covered by a pension scheme (ILO 2014).⁸⁶ Figure III. 1 displays these trends and shows that with the exception of North America (NA) and Europe and Central Asia (ECA) individual coverage rates are below 80 percent of the working population or even below 20 percent in South Asia.

Figure III. 1: Coverage of pension programs



Notes: ILO (2014). East Asia and the Pacific (EAP), Europe and Central Asia (ECA), Latin America and the Caribbean (LAC), Middle East and Northern Africa (MENA), North America (NA), South Asia (SA), and Sub-Saharan Africa (SSA).

⁸⁶ For an overview and discussion on causes and measurement of old-age poverty especially in developing countries see Barrientos et al. (2003).

These low coverage rates and frequently insufficient pension benefits in developing countries have been attributed by many scholars and pension experts to the specific nature of contributory retirement schemes (Willmore, 2007; Holzmann, 2012). Contribution-based pension systems, which link pension eligibility and benefits to previous contributions or work history, fail to achieve the desired outcomes in several cases. This is particularly relevant in developing countries in which workers who participate in contribution-based pension schemes are usually from the upper half of the wealth distribution. They are predominantly from urban areas with a secure career within the public sector while large parts of the population are left without effective pension coverage (Palacios & Sluchynsky, 2006; Willmore, 2007). The reliance on contributory pension systems alone has therefore been seriously questioned. As a consequence, several countries have introduced so called 'social pensions' (non-contributory funds), which provide cash transfers for the elderly with little or no link to previous contribution or work history.⁸⁷ In the context of the larger debate over pension reform, some argue that these social pensions are an effective way to deal with the limited coverage of contributory schemes and help alleviate poverty among the elderly (Willmore, 2007; World Bank, 2009; ILO, 2014; UNDP, 2014).

Surprisingly, despite the growing interest in and importance of non-contributory pensions around the world, little is known about the number of countries that have adopted such a pension scheme, the related geographical distribution across countries, and trends over time. In fact, the academic and policy literature in these fields have been entirely based on OECD countries (Gruber and Wise, 1997, 2002, 2005; Gruber et al., 2009; OECD, 2013; Wolf et al., 2014) or focused on individual country case studies only (Holzmann and Hinz, 2005; Willmore, 2007; Whitehouse et al., 2009; World Bank, 2009; Chomik and Whitehouse, 2010; Pallares-Miralles et al., 2012; Kaushal, 2014). While these are important contributions, the existing studies fail to provide a comprehensive overview of non-contributory pensions' distribution across a larger number or more heterogeneous countries and in the developing world. Moreover, no single analysis

⁸⁷ The terms social pension and non-contributory pension are used interchangeably throughout the chapter.

investigates to what extent the provision of this pension form is driven by different economic, demographic, political and international factors.

This article's principle objective is twofold: first, the trends of the development of non-contributory pension systems over time are illustrated, and second, a systematic analysis of the cross-country determinants of the introduction of social pensions shows the most relevant factors shaping the provision of old-age funds. By generating a new data set on social pension adoption using information from the database of *national labour, social security and related human rights legislations* (NATLEX) provided in the World Social Protection Report of the International Labor Organization (ILO, 2014), I compare alternative data sources and social pension classifications. This allows me to cover up to 185 countries over the 1960-2012 period. Thus, developed and developing countries are included comprehensively. Based on the political economy of social security spending and public good provision, the role of economic and demographic country characteristics is analyzed. Subsequently, I specifically focus on the influence of political institutions and international forces in the adoption of non-contributory pensions.

The results suggest that demographic factors are decisive for the adoption of social pension proxying for the demand of increased old-age public support. Whereas democratic countries are more likely to adopt social pension, more fractionalized governments have a lower probability of introduction. This correlation reflects that weaker governments are less likely to implement non-contributory old-age anti-poverty transfers. The influence of miscellaneous international leverage factors highlights that trade openness affects the launch of a social pension negatively while aid dependency of a country is not systematically related.

The remainder of the chapter is structured as follows. In Section III. 2 the data on social pensions are introduced, a consistent classification is provided and international facts and figures on the distribution and trends over the last five decades are described. In Section III. 3 I review the political economy literature on public good and pension provision and discuss theoretical predictions and empirical findings regarding the provision of social security and transfer programs. Testable hypotheses are developed thereafter. The empirical strategy is outlined and results are discussed in Section III. 4, while Section III. 5 concludes.

III. 2. SOCIAL PENSION AROUND THE WORLD

The diversity in design and shaping of pension programs in general and social non-contributory pensions in particular make a comparison across countries rather complex. I use a comprehensive classification and extract information from two sources. First, the 'Social Security Programs Throughout the World' (SSPTW) data, which provides information on mandatory pension programs around the world for the last decade. Second, the World Social Protection Report (ILO, 2014) provides details on contributory and non-contributory pensions across countries. I construct a data set which allows the description of worldwide trends over time in the provision of social pension.

III. 2.1. Classification of social pension

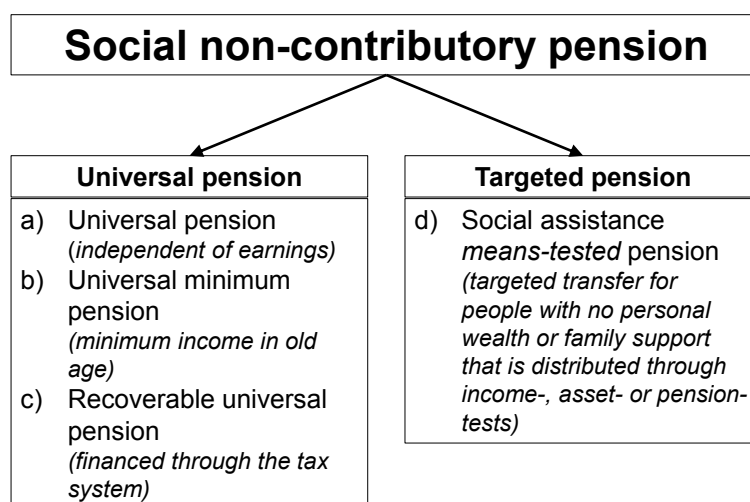
Since a diverse range of national systems exists in the provision of old-age cash transfers worldwide, only a clear classification of non-contributory social pensions allows a systematic analysis. The study focuses on social pensions or non-contributory pension systems that are used by governments to ensure against old-age poverty. The most comprehensive classification is provided by the World Bank's multi-pillar approach implemented in early 2000 (Holzman and Hinz, 2005).⁸⁸ Therein a new pillar, Pillar 0, was introduced and defined as "a non-contributory pillar (in the form of a demogrant⁸⁹ or social pension) that provides a minimal level of protection" (ibid.: 1). Social pensions are commonly financed from general government revenue and are distributed to the elderly on a targeted (means-tested, ear-marked) or universal basis.⁹⁰

⁸⁸ Diversity in pension system specifically and social security programs in general, with the goal to fight old-age poverty, made a pointed approach towards pensions necessary. The World Bank therefore expanded the three-pillar system to a five-pillar one (Holzmann and Hinz, 2005). The three pillar classification was introduced in 1994 (World Bank, 1994). Pillar 1 referred to a basic pension which represented an anti-poverty pillar that guarantees a minimum income at old-age irrespective of a person's earning history. Pillar 2 included a system of mandatory contributions to an earnings-related scheme, while Pillar 3 referred to a voluntary savings system available to anyone who wishes to supplement his/her retirement income by the first two pillars.

⁸⁹ Demogrant funds are universal flat rate funds based on other characteristics than contributions, i.e., age.

⁹⁰ The original Pillar 2 was split into a new Pillar 1 (public earnings-related pension) and a new Pillar 2 (private earnings-related pension), with Pillar 3 referring to voluntary contributions to occupational or private pension plans and Pillar 4 including a variety of non-pension retirement savings. See Willmore (2007) for a more detailed discussion on the respective pension pillars.

Figure III. 2: Social pension classification



Notes: SSPTW, various issues; ILO (2014).

a)-d) social pension components by Willmore (2012),

a) and d) Universal and targeted (means-tested) pension identified by ILO (2014).

The SSPTW reports do not clearly categorize a zero pillar or 'social pension'; therefore the classification of Willmore (2012) of components of social pensions provides useful information. It allows the identification of whether or not a country has some kind of social pension scheme anchored in national legislation. Figure III. 2 shows different aspects of social pension components (a)-(d). Willmore (2012) classifies four different systems to be part of social pension programs which are grouped in universal and targeted social pension. First, universal non-contributory pensions include (a) universal pensions, (b) universal minimum pensions, and (c) recoverable social pensions. And second, targeted social pensions include (d) means-tested social assistance pensions where means-tested includes income-, asset- or pension tests in order to be eligible to receive a pension.⁹¹

The advantage of this classification is that it includes all kinds of basic transfers to the elderly including flat-rate components and minimum provision of old-age income.

⁹¹ In detail, universal (minimum) pensions are provided to all residents or citizens independent of earnings, assets, family transfers or other forms of pension income. The funds are provided by the government and are transferred to all elderly residents independent of income. E.g., in Bolivia *Renta Dignita* is financed by the government through taxes on hydro-carbons and dividends from public enterprises. Recoverable social pensions are universally distributed dependent on years of service or residency, financed through the tax system (payroll taxes) and thus recoverable by tax authorities. Lastly, targeted (means-tested) social pensions are social assistance pensions that require applicants to pass a means-test guaranteeing a non-contributory pension for poor people with no personal wealth or family support.

These may also be part of mandatory individual accounts or other pay-as-you-go pension systems and may not necessarily be part of a non-contributory social pension.⁹² This allows taking the diversity of programs into account, but it also bears the risk that the definition includes very broad categories and may not be regarded as 'social' pension consistently. A narrow definition of social pension solely includes universal and means-tested pensions which refers to (a) and (d) in Figure III. 2. The advantage of this classification is that it specifically includes non-contributory components of pension programs which are largely targeted to reduce old-age poverty and is consistent with the classification of the World Banks' 'zero pillar'.

III. 2.2. Non-contributory pension data

The detailed classification allows me to construct indicators of whether countries have an earnings-related and/or social pension and which component of a social pension (universal or targeted) is implemented in the country. To the best of my knowledge, the only database that continuously reports data since 2001 is the SSPTW.⁹³ These reports combine information on national mandatory pensions provided by national agencies/officials in answer to a survey send out by the International Social Security Association (ISSA) and supplemented by data collected from the ISSA's Developments and Trends Annual Survey.⁹⁴ In total, the data set provides data on social security programs for up to 179 countries and has been issued in four regional reports over two-year periods since 2002.⁹⁵ Each report details country narratives covering all kinds of statutory social security programs (old-age, disability, health, etc.).⁹⁶ Information is clustered into three aspects: employment-related, universal and means-tested systems.

⁹² Pay-as-you-go (PAYG) pension systems are publicly managed pension systems promising the contributors future goods and services from the government by compulsory (earmarked) income taxes and are usually part of Pillar 1 in the revised system (Willmore, 2007).

⁹³ Initiatives by HelpAge International, the World Bank and other institutions such as the UN population division and the European Commission assess the extent, coverage and distribution of retirement programs globally. Although important in itself to collect as much data as possible to be able to establish best practice models, most of the information available from these sources is rather fragmented in its scope of countries or availability of information over time. For an overview see HelpAge International (2014).

⁹⁴ The SSPTW data has also been used in pension-related academic publications (e.g., Bloom et al., 2007).

⁹⁵ Online: <http://www.ssa.gov/policy/docs/progdesc/ssptw/> (accessed: 02.09.2014). Regional reports are available for Europe, Asia and Pacific, Africa and The Americas. Before 2000 these reports are compiled in single versions following a different structuring and are not publicly available.

⁹⁶ These are intended to "insure individuals against interruption or loss of earnings power and certain special expenditures arising from marriage, birth, or death" (see SSPTW: Africa, 2013: 1).

The first two provide the individual by right with benefits in case of shock (i.e., injury, death) and the third system bases the benefits formula on personal income or resources. I first code an indicator of social pension that includes components (a)-(d) and a contributory indicator including earnings-related pensions and provident funds,⁹⁷ and second indicators for each of the categories are coded singularly.

Two major shortcomings are, however, first, the reporting bias and subjectivity that may be prevalent in the data. Second, the short time-frame (2002-2012) leaves out important developments of non-contributory pension provision of earlier decades. Therefore, I extend the time frame and expand the data set with additional information on contributory and non-contributory pensions worldwide over the 1960-2013 period. This information is extracted from the database of *national labour, social security and related human rights legislations* (NATLEX) of the World Social Protection Report issued by the International Labor Organization on main social security programs and non-contributory pension schemes (ILO, 2014).⁹⁸ The ILO provides an overview of pension programs including the type of program, the date of the first law, the name of the non-contributory scheme, the year it was introduced, and legal requirement characteristic. This information is used to classify the different systems in the same way as the SSPTW data. It differs from the SSPTW information in that I do not have detailed information on components of contributory pension systems and therefore will only use information compatible to the narrow definition of social pension (Figure III. 2: (a)+(d)). The extended data set now provides information on 185 countries including information that dates back until 1891 where a non-contributory pension scheme was implemented in New Zealand.⁹⁹ The observation period starts in 1960, because most information on relevant variables is not available before and even then information is fragmented.

In the following, I compare both data sources and thereby describe the main facts and trends in social pension provision. One cautious note is still in order: since the

⁹⁷ Earnings-related pensions are old-age retirement systems based on the work history of the individual. Provident-funded pensions are publicly managed funds where compulsory savings of employees, retained from wages, are matched by employer's contributions, invested and paid at pension age. The latter are mainly used in developing countries.

⁹⁸ See Annex IV: Statistical tables, Tables B6 and B7 (ILO, 2014).

⁹⁹ Other countries are reported before 1960, for instance, Denmark (1891) implementing a national universal pension, Australia (1900) providing a targeted 'age pension' or United Kingdom (1909) adopting pension credits that are targeted non-contributory pensions.

distribution and trends show the existence of pension programs, first, they hide the fact that availability of pension per se says nothing about the coverage of the population. Second, it cannot be addressed whether or not the level of the pension secures an adequate living standard for those covered.

III. 2.3. Facts and figures

Social pension data

Comparing the provision of pension systems worldwide between the two data sources, the SSPTW data (Table III. 1) has a lower coverage of countries in general compared to the data from NATLEX (Table III. 2). By 2012 153 countries are reported to have a contributory pension in the SSPTW data, but 176 countries are reported in the ILO data.¹⁰⁰ Looking only at social (non-contributory) pensions, 85 and 96 countries are reported in 2012, respectively. This difference may be due to the fact that some countries do not respond to the SSPTW survey which leads to a lower coverage in general.

The difference in the definition becomes obvious in the second panel of both tables where we show the detailed components of each social non-contributory pension. According to Willmore (2012) universal minimum and recoverable minimum pension are also part of social pension systems. Including these in the count of social pensions the overall number of universal pensions substantially increases. In the extended data set (Table III. 2) I only have information on universal pensions. The numbers are roughly comparable to reported universal pension from the SSPTW data where 15 countries report to have a universal pension. In the ILO data set it is 17 countries in 2012. The data also differs substantially in the information on targeted (means-tested) pension where 58 countries are observed in 2011/2012 (SSPTW). This number is already reached in 2000 and increases to 79 countries according to the ILO data.

Only speculations are possible about the reasons for this deviation. It seems to be the case that reporting or coding bias may be an issue in the SSPTW data set. This is simply exemplified looking at differences in reporting over the years. Six countries

¹⁰⁰ The complete list of countries is provided in appendix Table A III. 3.

report abolishing social pension in the last decade.¹⁰¹ While inconsistency are not identified for Senegal and Turkey who report no social pension since 2004 and 2003, respectively, reporting in Turkmenistan might be prone to reporting bias. Given that abolishment is reported in the last period in 2011 and further information is not yet available, this will become clear with the next report. Note that Ecuador reports a social targeted pension in 2004 and no social pension since 2011.¹⁰² In Latvia no means-tested pension is reported in 2003 whereas in all other years the report indicates existence of such a pension.

Taken together the SSPTW data has major disadvantages, which led me to construct a different data set. I use the narrow definition of social pension in this analysis, which guarantees first, the comparability across countries and second, the sole focus on specific social pension programs targeted at old-age poverty reduction.¹⁰³ Another advantage is the extension of the time frame looking at characteristics of implementation in the last five decades. This is possible because the World Social Protection Report provide information on the year of the law implementing non-contributory (and contributory) pensions for each country.

¹⁰¹ While abolishment or reforms of pension systems are ongoing processes, jumps from one year to another seem rather unlikely.

¹⁰² In the report of Ecuador (SSPTW, 2008) it is noted that the Social Security law of 2001 is not fully implemented, which either could mean that the reported pension is not yet implemented or that it will never be implemented. The report is not clear in that instance.

¹⁰³ Critiques may argue that other components of pension systems are also used to prevent old-age poverty; however, the aim of the analysis is to focus on the zero pillar (non-contributory) pensions, which are targeted individuals that have never contributed to any pension system.

Table III. 1: SSPTW pension data by region (2001-2012)

Region	Contributory pension						Social pension						N
	2001/2002		2005/2006		2011/2012		2001/2002		2005/2006		2011/2012		
East Asia & Pacific	17	47%	17	47%	19	53%	8	22%	8	22%	10	28%	36
Europe & Central Asia	42	74%	44	77%	43	75%	35	61%	37	65%	38	67%	57
Latin America & Caribbean	32	78%	32	78%	32	78%	18	44%	22	54%	21	51%	41
Middle East & North Africa	16	76%	15	71%	17	81%	2	10%	2	10%	2	10%	21
North America	2	67%	2	67%	2	67%	3	100%	3	100%	3	100%	3
South Asia	5	63%	4	50%	4	50%	1	13%	3	38%	3	38%	8
Sub-Saharan Africa	36	75%	35	73%	36	75%	6	13%	5	10%	8	17%	48
World	150	70%	149	70%	153	71%	73	34%	80	37%	85	40%	214

Region	Universal pension				Universal minimum pension				Recoverable universal pension				Means-tested				N
	2001/2002		2011/2012		2001/2002		2011/2012		2001/2002		2011/2012		2001/2002		2011/2012		
East Asia & Pacific	4	11%	4	11%	0	0%	0	0%	3	8%	4	11%	3	8%	5	14%	36
Europe & Central Asia	1	2%	3	5%	0	0%	1	2%	15	26%	21	37%	25	44%	25	44%	57
Latin America & Caribbean	0	0%	1	2%	4	10%	6	15%	2	5%	3	7%	12	29%	18	44%	41
Middle East & North Africa	0	0%	0	0%	0	0%	0	0%	2	10%	2	10%	1	5%	2	10%	21
North America	1	33%	1	33%	0	0%	0	0%	1	33%	1	33%	2	67%	3	100%	3
South Asia	0	0%	1	13%	0	0%	0	0%	1	13%	0	0%	0	0%	2	25%	8
Sub-Saharan Africa	2	4%	5	10%	0	0%	0	0%	1	2%	0	0%	3	6%	3	6%	48
World	8	4%	15	7%	4	2%	7	3%	25	12%	31	14%	46	21%	58	27%	214

Notes: The top panel shows the existence of contributory and non-contributory (social) pensions and the respective share of countries in the regions in periods 2001/2002, 2005/2006 and 2011/2012. The lower panel shows reported components of social pensions and regional shares in 2001/2002 and 2011/2012.

Table III. 2: ILO pension by region (1960-2012)

Region	Contributory pension								Social pension								N
	1960		1980		2000		2012		1960		1980		2000		2012		
East Asia & Pacific	8	22%	19	53%	24	67%	25	69%	4	11%	10	28%	10	28%	14	39%	36
Europe & Central Asia	46	81%	47	82%	49	86%	49	86%	20	35%	34	60%	34	60%	38	67%	57
Latin America & Caribbean	19	46%	33	80%	34	83%	34	83%	7	17%	15	37%	15	37%	26	63%	41
Middle East & North Africa	9	43%	16	76%	17	81%	18	86%	2	10%	2	10%	2	10%	2	10%	21
North America	1	33%	2	67%	3	100%	3	100%	2	67%	3	100%	3	100%	3	100%	3
South Asia	2	25%	4	50%	5	63%	5	63%	0	0%	3	38%	3	38%	3	38%	8
Sub-Saharan Africa	11	23%	35	73%	39	81%	42	88%	2	4%	6	13%	6	13%	10	21%	48
World	96	45%	156	73%	171	80%	176	82%	37	17%	47	22%	73	34%	96	45%	214

Region	Universal pensions								Targeted pensions								N
	1960		1980		2000		2012		1960		1980		2000		2012		
East Asia & Pacific	3	8%	4	11%	6	17%	7	19%	1	3%	1	3%	5	14%	8	22%	36
Europe & Central Asia	2	4%	2	4%	2	4%	2	4%	18	32%	21	37%	32	56%	35	61%	57
Latin America & Caribbean	2	5%	2	5%	3	7%	4	10%	5	12%	9	22%	12	29%	22	54%	41
Middle East & North Africa	0	0%	0	0%	0	0%	0	0%	2	10%	2	10%	2	10%	2	10%	21
North America	0	0%	0	0%	0	0%	0	0%	2	67%	3	100%	3	100%	3	100%	3
South Asia	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	3	38%	3	38%	8
Sub-Saharan Africa	1	2%	1	2%	4	8%	4	8%	1	2%	2	4%	2	4%	6	13%	48
World	8	4%	9	4%	15	7%	17	8%	29	14%	38	18%	59	28%	79	37%	214

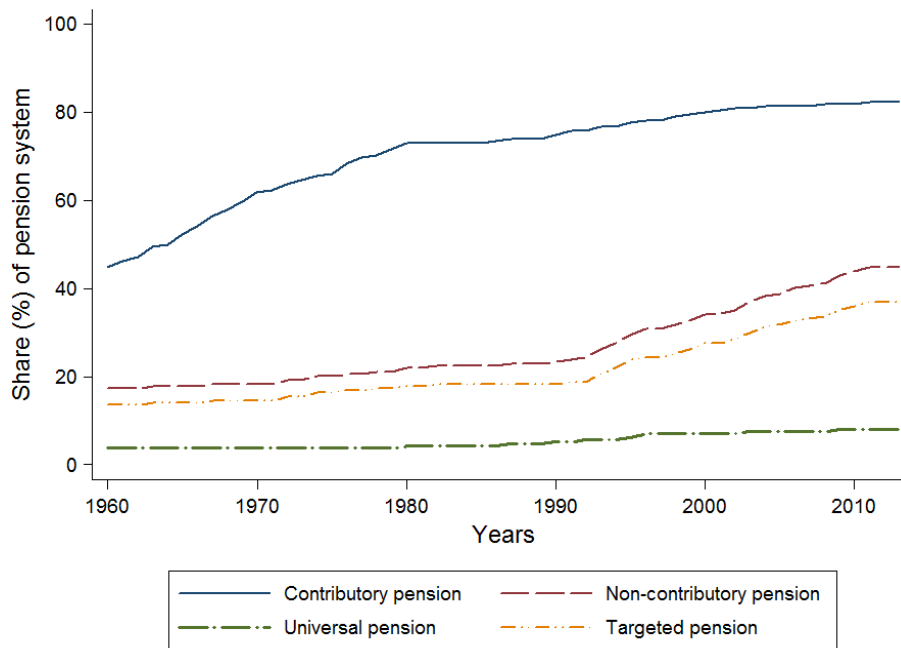
Notes: The top panel reports the number of countries with contributory and non-contributory pensions and respective regional shares in 1960, 1980, 2000, 2012 and the lower panel reports the components of non-contributory pensions (universal and targeted pensions) and their shares in the same years.

Distribution and trends

Looking at the development of pension programs worldwide in Figure III. 3, provision of earnings-related pensions has almost doubled since 1960. The major increase in the provision of contributory pension, covering the working population and being financed through contributions from employees and/or employers, is observed in the first two decades between 1960 and 1980. The only regions that still lack behind in earnings-

related pension provision with only 69 and 63 percent of countries covered are East and South Asia (Table III. 2). All other regions show coverage of over 80 percent of countries with 100 percent coverage in OECD countries (ILO, 2014).

Figure III. 3: Development of pension provision (1960-2012)



Notes: Own calculations based on ILO (2014).

Social pensions are prevalent in 20 percent of countries already in the 1960s with only a minor increase until 1990 (from 17 percent to 24 percent of countries). In total, 37 countries (worldwide) have a non-contributory pension already in 1960. Most of these are from Europe and North America.¹⁰⁴ Since then major changes in the provision of non-contributory pensions worldwide took place and coverage of countries reaches almost 50 percent in 2012. Principle reforms and implementation of social pension components within national pension systems are mainly observed since the 1990. In 2000 the share of countries has doubled compared to the level in 1960 and reached 34 percent of countries providing old-age cash transfers with major increases in Latin America and South Asia. In 2012 45 percent of countries have such pension systems where the major changes

¹⁰⁴ These countries are: Armenia, Aruba, Australia, Barbados, Belarus, Bulgaria, Canada, China, Denmark, Dominican Republic, Estonia, Finland, Guyana, Iceland, Ireland, Isle of Man, Israel, Japan, Kyrgyz Republic, Latvia, Malta, Mauritius, Mexico, Netherlands, New Zealand, Norway, Poland, South Africa, Sweden, Switzerland, Trinidad and Tobago, Turkmenistan, Ukraine, United Kingdom, United States, Uruguay and Uzbekistan.

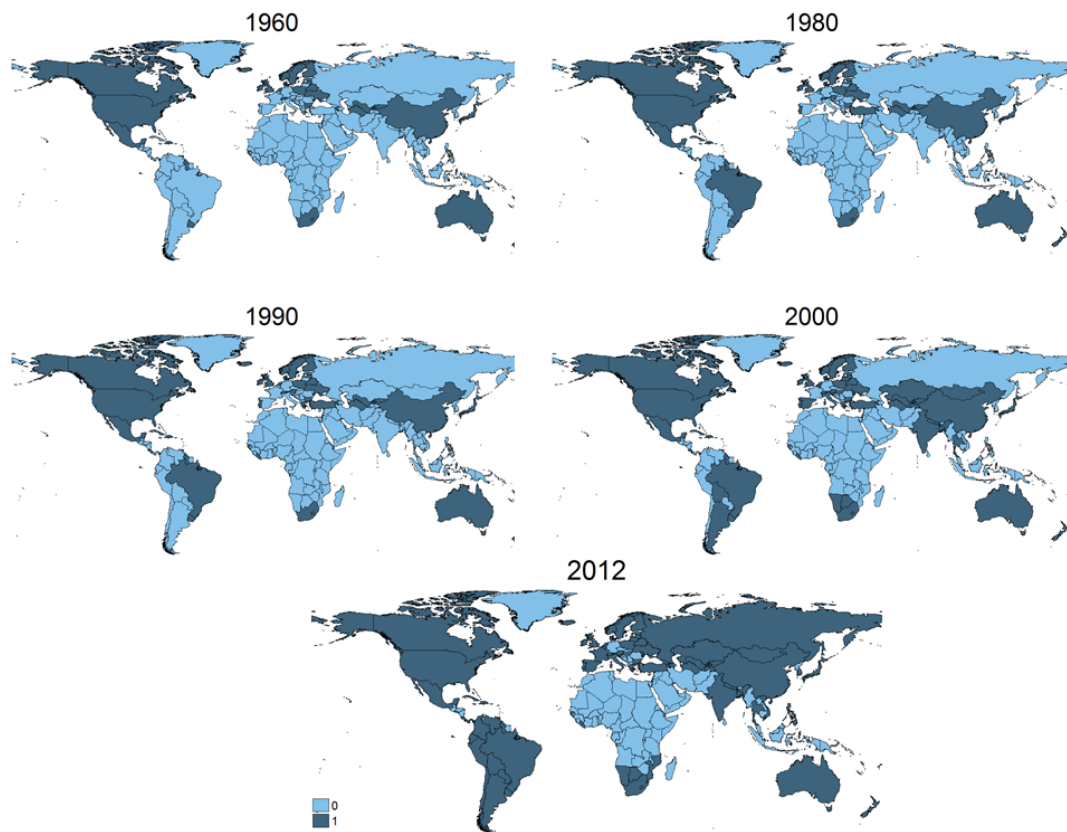
again are observed in Latin America with an increase of an additional 27 percent (11 countries). As shown in Figure III. 2, countries foremost provide targeted pensions that provide a conditional cash transfer to elderly with no other means of pension income. Countries in North America, Europe and Central Asia, Latin America and the Caribbean are the main providers of this form of social pension with more than 50 percent of countries of each region. Eight countries in East Asia and six in Sub-Saharan Africa have a targeted social pension in 2012.¹⁰⁵

In contrast, non-contributory universal pensions are only provided in eight percent of countries worldwide which represents 17 countries in total. The largest share in this category is provided in East Asia with seven countries in total.¹⁰⁶ No changes and no uptake at all are observed in the provision of universal pension in North America, the MENA region and South Asia (see Table III. 2). In Latin America and Sub-Sahara Africa four countries each, and two countries in Europe, have a universal pension.¹⁰⁷

¹⁰⁵ Countries providing targeted pension in 2012: In East Asia and the Pacific are Australia, Brunei Darussalam, China, Fiji, Hong Kong, Japan, Kiribati, Republic of Korea, Mongolia, New Zealand, Philippines, Samoa, Thailand, and Vietnam. Countries in Sub-Saharan Africa are Botswana, Cabo Verde, Lesotho, Liberia, Mauritius, Mozambique, Namibia, Seychelles, South Africa and Swaziland.

¹⁰⁶ These countries are Brunei Darussalam, China, Hong Kong, Japan, Kiribati, New Zealand and Samoa.

¹⁰⁷ These countries are Botswana, Mauritius, Namibia and Seychelles in Africa, Aruba, Bolivia, Guyana and Paraguay in Latin America, and Denmark and The Netherlands in Europe.

Figure III. 4: Distribution of social pension (world)

Notes: Own calculations based on ILO (2014).

The regional trends are visualized in Figure III. 4. They show clear patterns: over the years Latin American countries are the first countries implementing social targeted pension's, followed by Central and Eastern Asia. The African continent is colored more light throughout the whole period with almost no changes.

Overall, it is observed that targeted social pensions are more popular worldwide than universal pensions, given the latter are provided to the whole population solely based on age and citizenship, because they are costly. No reform efforts are undertaken in contributory pensions in the last two decades whereas non-contributory pensions gained importance especially in that time period.

III. 3. DRIVERS OF SOCIAL PENSION: THEORY, EVIDENCE AND HYPOTHESES

The Universal Declaration of Human Rights¹⁰⁸ and the International Covenant on Economic, Social, and Cultural Rights¹⁰⁹ establish social security as a basic human right. This rights-based approach requires states and the international governance structure to provide a cash income in the form of a pension on a regular and predictable basis to the elderly (Bloom and McKinnon, 2013; Barrientos and Hulme, 2009). The redistributive nature of social non-contributory pensions is different from contributory pension schemes in that they are funded through general governmental revenues. Besides the cost-intensity of social pensions (especially of universal pensions) critics often regard the redistribution of resources between young and old (and rich and poor) as burdensome for productivity. Additionally, traditional support systems such as intra-family transfers or work-ethics may be crowded out further (Willmore, 2007). The literature provides three lines of argument to explain the emergence and provision of social pensions through targeted government spending: economics and demographics, the political system and its structure, and international transmission channels.

After the initial investment of financial resources that are needed for the implementation of a pension system, annual governmental budgets need to be available to ensure long-term financial sustainability. Changing socio-economic conditions affect the financial stability of government resources and, as a consequence, determine the continuation of (tax-funded) non-contributory pension systems.

¹⁰⁸ Adopted by UN General Assembly Resolution 217A (III) of 10 December 1948; Articles 22 and 25. Article 22: Everyone, as a member of society, has the right to social security and is entitled to realization, through national effort and international co-operation and in accordance with the organization and resources of each State, of the economic, social and cultural rights indispensable for his dignity and the free development of his personality.

Article 25: (1) Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing, and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old-age or other lack of livelihood in circumstances beyond his control. (2) Motherhood and childhood are entitled to special care and assistance. All children, whether born in or out of wedlock, shall enjoy the same social protection.

¹⁰⁹ Adopted by UN General Assembly Resolution 2200A (XXI) of 16 December 1966; Article 9.

Article 9: The States Parties to the present Covenant recognize the right of everyone to social security, including social insurance.

Economics and demographics

The political economy literature focuses on the efficiency and cost effectiveness of such programs as main explaining factors. Positive theories suggest that efficiency concerns are the sole driver of social security provision (Sala-i-Martin, 1996; Tabellini, 2000), and consequently of social pension adoption and continuation. Accordingly, the key explanatory variables are economic and demographic factors, since those are central variables in determining sustainability in the expansion of government spending (Mulligan and Sala-i-Martin, 1999) as well as the tax base.

In political economy models of voting, pension reforms are adopted if the old and the middle aged form a majority voting coalition which cannot be defeated by younger generations (e.g., Cooley and Soares, 1999; Shoven and Slavov, 2006; Tabellini, 2000). Mulligan et al. (2010) show empirically that the share of the elderly population (older than 65 in total population) is a robust positive determinant of social security spending. Additionally, Mulligan and Shleifer (2005) demonstrate theoretically and empirically in a fixed cost theory of regulation that social security expenditures in general are driven by the size of the affected population and administrative costs. They argue that regulatory costs may be reduced if a similar jurisdiction is already in place. Countries in which contribution-based pensions exist may be more inclined to also adopt a social non-contributory pension, since the institutional environment (i.e., agency responsible for the management of the program, lists of beneficiaries, legal environment, etc.) is already in place (Hugo and Cook, 2012). However, one could also expect those countries see no need in the adoption of social pension.

Overall, the literature suggests that both economics and demographics are the principal variables in determining the adoption and persistence of a social pension. The following economic and demographic variables are used: (ln) GDP per capita in international Purchasing Power Parity (PPP) from the Penn World Tables (PWT 8.1; Feenstra et al., 2015) and its square to account for the general economic situation of each country, state capacity and the general living standard. Given the large coverage in OECD countries, the relationship between the income level and social pension is likely to be non-linear. I expect it to positively affect social pension adoption at lower levels of income with decreasing probability at higher levels of income (Jung and Tran, 2012).

Additionally, state capacity is determined by the savings rate, the ability of public and private actors to restore assets. Savings are either expected to positively affect the ability of the state to provide public pension or lower private savings (high current consumption) increasing the need for public support in old-age suggesting a negative relation. There are no clear predictions which effect dominates. Gross savings in terms of GDP from the WDI data set is used (World Bank, 2014).

Demographic characteristics are proxied by population growth, fertility and life expectancy rate at birth from the World Development Indicators (WDI; World Bank, 2014). A growing population is associated with an increase in the tax base and thus a positive correlation with the probability of social pension adoption. Decreasing fertility and increasing life expectancy are indicators of aging of societies. In general, the provision of old-age retirement income is positively related to the demographic composition of countries, because it determines the potential number of contributors and pensioners (Pallares-Miralles et al., 2012). In countries with high fertility rates the need for social pension provision might be less pressing since within-family support systems are still intact (Entwisle and Winegarden, 1984).¹¹⁰ Considering the costs of implementation I control for the existence of contributory pension and isolate the effect on social pensions.

Political institutions

A second strand of political economy arguments emphasizes the role of political institutions in social security provision (Galasso and Profeta, 2002). Testing their predictions, Mulligan et al. (2004) find no difference between autocracies and democracies in the provision of different public policies. Similarly, Mulligan et al. (2010) find no differential effects in the size of retirement programs between democracies and autocracies once they control for economic and demographic variables. Giulliano and Mishra (2014) show that a democratic political system favors reforms in different economic sectors such as the financial sector, the capital and current account, the

¹¹⁰ Another potential demographic factor influencing the population composition of countries is migration. This is, however, still only a minor factor, according to Pallares-Miralles et al. (2012), depending heavily on the age structure of the migrants. Given the persistent low quality of migration data especially in a multi-country context we do not include it in our analysis.

product and the agriculture market, and on the amount of trade. This could suggest that generally reforms are more likely in democracies. Case studies support this assumption regarding social pensions. Hugo and Cook (2012) present case studies from Asia and argue that a democratic political system facilitates the provision of social pension, because civil society alliances support the emergence of social welfare programs. General societal support is needed to motivate the implementation of such a program and to ensure that it is maintained. I test whether there is a differential impact in democratic compared to non-democratic regimes in the case of social pension provision. As a larger share of the voting population grows old, countries might be under pressure to reduce old-age income insecurity to please their electorate. Democracies might also be more likely to introduce social pension as a vote-maximizing strategy if the share of the elderly among voters increase. However, the same argument may be true for autocratic regimes since also autocratic leaders need to please their elderly supporters.

Hypothesis 1: The provision of social pension is more likely in democratic countries, ceteris paribus.

To test Hypothesis 1, the democracy indicator of Cheibub et al. (2010) is employed, which is available for the 1960-2008 period. The dummy distinguishes between democratic regimes with electoral voting schemes to establish executive and legislative offices and autocratic regimes where this is not the case. The indicator has been widely used and is well accepted in the economic literature.¹¹¹

A second source of differences in political institutions influencing targeted government spending are the ideological orientation of governments and the extent to which governments are fractionalized (e.g., Roubini and Sachs, 1989a, b). First, the ideological orientation of governments shape targeted spending, because it is presumed that socialist parties if in power expand the welfare state. New evidence from a set of 55 different countries shows that socialist governments are in favor of state interventions and redistribution in order to reduce income inequality (Keefer and Milanovic, 2014).¹¹²

¹¹¹ We also use the Polity IV data set to test the predictions and the results are qualitatively the same.

¹¹² Several studies empirically show that party ideology matters in OECD countries in the allocation of grant aid to least developed and middle-income countries (Brech and Potrafke, 2014), and in German aid

In line with these observations, left-oriented governments are expected to be in favor of social pensions and have a higher probability of adoption. I use the measure of the party orientation of the chief executive provided by the Database of Political Institutions (DPI; Beck et al., 2001, updated 2013), which distinguishes between right, left and centric orientation on a three-scale indicator. A dummy variable is generated that turns one for left-oriented governments and zero for right- or center-oriented governments. Thus, the effect of the variable compares the difference between left-oriented governments and other orientations. The effect is expected to be positive.

Second, empirical results testing the impact of fractionalization show that it increases governments' deficits (Volkerink and de Haan, 2001) and the size of government spending, subsidies and transfers (Scartascini and Crain, 2002). Budgetary competition increases in more fractionalized governments where each party seeks to please their own constituency (common pool problem) without internalizing the costs (Weingast et al., 1981). Topic-specific coalitions are formed ad-hoc by mutually agreeing to grant favors increasing log-rolling (Scartascini and Crain, 2002). In the context of social pensions, I would expect the probability of social pension adoption rising if governments are more fractionalized due to larger government spending. Thus, the composition of political institutions in the form of government fractionalization has been shown to influence government spending which would affect welfare expenditures in particular.

Hypothesis 2: The strength of governments and its socialist orientation increase the probability of social pension provision, ceteris paribus.

The government fractionalization index that mirrors the probability that two deputies picked at random from among the government parties will be of different parties is used (Beck et al., 2001) to test this relationship for social pension provision. I would expect a negative coefficient, since higher levels in the government fractionalization measure means more fractionalization.

allocation (Dreher et al., 2015b). Fuchs et al. (2012), however, do not find a significant relationship in a worldwide sample of countries.

International influence

Finally, sociology and political science literature on the expansion of social assistance suggests that national political processes are subject to international influence. Leisinger and Barrientos (2013) accord the main reason for the rise in the number of social pensions in the last decade to the international proliferation of social-policy innovations. Political constructivism and coercion theory predict diffusion of global norms through the international community (e.g., Dobbing et al., 2007). For instance, global norms might be diffused by multilateral organizations such as the World Bank or the IMF that often require policy reforms as condition for lending (e.g., Williamson, 1993; Gore, 2000). Dobbing et al. (2007: 451) emphasize that countries, which are subject to international leverage, such as trade, aid or security concerns, are more likely to adopt reforms promoted by powerful actors. Trade openness has been shown to increase social security spending in Latin American countries (Avelion et al., 2005) supporting the compensation perspective of increased international competition via higher social security support. In terms of pensions, Palacios and Sluchynsky (2006) show that, particularly in the area of pension, peer effects through policy transfer seem to lead to the introduction of mandatory contributory schemes in Latin America, Africa, the Middle East and Asia. This might also hold for non-contributory schemes.

Aid allocation could be another trigger. Aid does not include financial grants and loans only, but also technical assistance in form of expertise and knowledge on implementation, program design and sustainability. The allocation of development assistance has been shown to be influenced systematically by strategic considerations (Dreher et al., 2009a, b). On the one hand, aid that is rather politically motivated and/or tied to conditions including social security reforms may force countries to implement a social pension even if national conditions do not constitute a demand for increased social spending.¹¹³ On the other hand, international support increases a government's budget and may lead to the expansion of national government spending. Studies show that development aid supports government's budget financed programs, such as social

¹¹³ Politically motivated aid has been shown to be attached to fewer conditions in IMF programs than in other forms of aid (Dreher et al., 2009a) and that it is less effective to increase economic growth (Dreher et al., 2013).

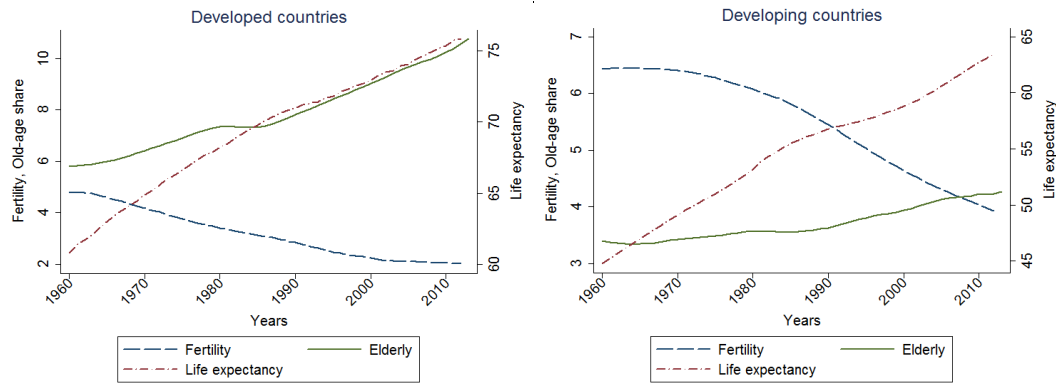
pensions (Bloom and Mc Kinnon, 2013) and that donors support social policies in recipient countries (Dreher et al., 2015a).

Following these arguments, open countries and countries that are dependent on aid should be more prone to international leverage increasing the probability of social pension adoption. The influence of international leverage in the adoption of social pension is tested using trade openness – the ratio of exports and imports to GDP (World Bank, 2014). The WDI's aid as a share of government expenditure (Aid/Gov.exp.) variable to proxy for aid dependency is employed (World Bank, 2014). The hypothesis is the following:

Hypothesis 3: International leverage through trade and aid provision increases the probability of social pension implementation, ceteris paribus.

III. 4. EMPIRICAL ANALYSIS

Based on the deliberations in the last section, the empirical analysis focuses on three different types of variables: economic and demographic, political system, and international influence variables. The dependent variable is a binary indicator of whether or not a country has a social pension between 1960 and 2012. The unit of analysis is a country over a five year period leading to a maximum of 1,205 observations, depending on the availability of control variables. I investigate what drives the implementation of social pension programs in the last five decades. In addition, I focus on whether drivers differ in developing compared to developed countries. Since delayed demographic trends in developing countries are obvious, the decision to provide social pension may be different in this set of countries. In Figure III. 5 these different patterns are visualized. In the left figure the evolution of the variables in developed and in the right panels in developing countries is displayed. The fertility rate is much lower and life expectancy much higher in developed compared to developing ones. Additionally, the share of elderly population steadily increases in both reaching 10 percent in developed, but only 4 percent in developing countries. This makes a separate assessment plausible.

Figure III. 5: Fertility, old-age population and life expectancy over time

Notes: Own calculation. The left figure shows the development of fertility, life expectancy and share of the elderly population in industrialized countries, the right panel the same in developing countries. Developing countries are classified according to the World Bank with a yearly GNI per capita of up to US\$4,125 (low income and low middle income countries according to the World Bank, 2014).

III. 4.1. Method

I estimate the conditional probability of a country having a social pension by the duration adjusted probit model in the following general form:

$$P(Y_{it} = 1|X_{it-1}) = f(\alpha + \beta'X_{it-1} + \delta_r + \Lambda_t + \varepsilon_{it}) \quad (\text{III. 1})$$

where $i = 1, \dots, N$, $t = 1, \dots, T$ and Y_{it} indicates whether or not a country i has a non-contributory pension in period t , X_{it-1} is a vector of covariates, α is a common constant, β are parameters to be estimated and ε_{it} is the idiosyncratic multivariate normal error term. Robust standard errors that are clustered at the country level are used to allow for within country dependence over time. Additionally, δ_r controls for common income-related regional trends disaggregated into income levels. Since different trends in high, middle and low income countries are observed, the regions are disaggregated along these lines to capture heterogeneity within major world regions.¹¹⁴ Beck, Katz and Tucker (1998) also show that "annual binary time series-cross sectional data are equivalent to grouped duration data with an observational interval of one year" (p. 1265) which can be estimated by an ordinary probit or logit link controlling for duration dependence by

¹¹⁴ The results are robust to the conditional logit estimator with regional income group identifier and linear probability estimates.

including temporal dummies or splines.¹¹⁵ I use a probit link ($f(\cdot) = \phi(\cdot)$) in order to appropriately model the binary dependent variable and use time dummies, λ_t , to control for duration dependence in the application of social pensions. In the tables average marginal effects (AME) are reported to interpret the sign, size and significance of the effects (Ai and Norton, 2003; Greene, 2010). All explanatory variables are lagged by one period (five years).¹¹⁶ Since social pension implementation is generally a long-term process, pension experts suggest careful analysis and adequate planning and evaluation to put a social pension program into practice. Implementation of a new pension scheme is frequently accompanied by a preceding political decision-making process and the subsequent establishment of new institutions which might take several years especially in less developed countries (e.g., Pigott et al., 2009).¹¹⁷ By taking these structural adjustments in the implementation of social pension into account it is possible to control for the sequence of events, but all forms of endogeneity are not completely ruled out, which makes a causal interpretation of the findings difficult. I test additional channels later, first, to ensure that I identified the most important drivers of social pension adoption, and second, to reduce potential omitted variable bias. The results are stable to these stress tests suggesting that endogeneity is no major concern in this setting.

III. 4.2 Results and discussion

Table III. 3 reports the main findings using the duration adjusted probit models and displays average marginal effects (AME). The number of observations varies between 1205 and 821, depending on the availability of data. All regressions have a pseudo R

¹¹⁵ The authors show that by adjusting for duration dependence in ordinary logit or probit models the results mirror Cox proportional hazard models and are appropriate in the application of binary time series-cross section data (Beck et al., 1998).

¹¹⁶ Summary statistics for all variables used are provided in Table A III. 1 and a detailed description of variables and sources is provided in Table A III. 2.

¹¹⁷ The choice of the lag structure is somewhat arbitrary. All estimations have therefore been conducted using different lags. The results do not change qualitatively and are available from the authors. After discussions with Sandra Kissling, expert from the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) responsible for the implementation of a social security system in India, on social pension implementation, we assume the one period lag to be the most plausible. Since the social pension variable takes a value of one if “laws and regulations are in force” it is plausible to assume that it takes around five years to implement such legislations. However, this includes no information on coverage or reach of the programs.

squared of over 0.36 and the Wald test p-values of joint significance highlight good model fit.

In terms of the demographic and economic variables I find savings, fertility rate and the existence of a contribution-based pension system to be statistically related to social pension adoption. In the overall sample the AME of GDP per capita never turns statistically significant at conventional levels. The marginal effect of savings is significant at the 5 percent level. A decrease in the savings rate, thus, is systematically related to an increase in the probability to have a social pension by 0.39 percent in column 1. This finding suggests that on average decreasing savings increases the probability of social pension provision slightly (substitution effect). Presumably, countries that have low level of savings are more like to provide old-age security.

A decrease in the fertility rate is related to an increase in the probability to adopt a social pension program and provide against old-age poverty by public funds. The effect is negative and significant across all specifications. The average marginal effect of life expectancy on the probability of implementation is also negative, but not statistically significant at conventional levels. High fertility levels and similarly high life expectancy lower the probability of social pension adoption, *ceteris paribus*. This is in line with Entwisle and Winegarden (1984) who show that public pension and fertility rates and life expectancy are inversely correlated. Given the projections of an ongoing decrease of fertility and increase of life expectancy (Pallares et al., 2012) this relationship shows that the increase in demand for social pension is an important driver of the introduction of social pension. Increasing life expectancy goes hand in hand with an increase of costs for a rising share of the elderly, which is one possible explanation for negative correlation.

Table III. 3: Determinants of social pension implementation

	(1)	(2)	(3)	(4)	(5)
(ln) GDP pc	0.4897 (0.377)	0.4840 (0.383)	0.1570 (0.419)	0.1467 (0.348)	-0.2616 (0.393)
(ln) GDP pc squared	-0.0201 (0.022)	-0.0200 (0.022)	-0.0022 (0.025)	-0.0000 (0.020)	0.0225 (0.023)
Population growth	0.0002 (0.019)	0.0040 (0.018)	-0.0152 (0.019)	0.0325 (0.024)	0.0262 (0.026)
Savings	-0.0039** (0.002)	-0.0030* (0.002)	-0.0042** (0.002)	-0.0042** (0.002)	-0.0038** (0.002)
Fertility rate	-0.1006*** (0.026)	-0.0963*** (0.026)	-0.1344*** (0.031)	-0.1358*** (0.028)	-0.1724*** (0.035)
Life expectancy rate	-0.0027 (0.005)	-0.0049 (0.005)	-0.0048 (0.006)	-0.0052 (0.005)	-0.0092 (0.006)
Contributory pension	0.2854*** (0.062)	0.2572*** (0.061)	0.3011*** (0.093)	0.2614*** (0.059)	0.2502*** (0.091)
Democracy		0.1200** (0.047)			0.0888** (0.043)
Gov. fractionalization			-0.0956 (0.087)		-0.1623** (0.078)
Party orientation (left)			0.1086*** (0.035)		0.1019*** (0.032)
Trade share				-0.0013** (0.000)	-0.0013** (0.001)
Aid/Gov.exp.				-0.0001 (0.000)	-0.0003 (0.000)
# of Observations	1116	1116	788	1065	757
# of Countries	147	147	138	147	136
pseudo R-squared	0.38	0.39	0.39	0.40	0.43
Wald test (p-value)	0.00	0.00	0.00	0.00	0.00
Log Likelihood ratio	-465.87	-457.30	-329.46	-425.90	-295.11

Notes: The dependent variable is a binary variable indicating if the country has a social pension. Average marginal effects reported. Standard errors in parentheses clustered at the country level. Significance levels: * p<0.1, ** p<0.05, ***p<0.01. All models include time-period and region-income dummies (World Bank region classification 2015). Explanatory variables lagged by one period.

The existence of a contributory pension system is positively related to the probability of social pension adoption. Presumably, the existence of pension infrastructure reduces costs and increases the probability to also provide social non-contributory pension.

Turning to the hypotheses, in column 2 the indicator of whether or not the country is a democracy is included testing for Hypothesis 1. Being a democracy increases the probability of social pension provision significantly at the 5 percent level. This is in contrast to Mulligan and Shleifer (2010) who find no difference between the two political systems. However, the result suggests that participation in the political system supports the provision of social pension. The size of the effect indicates that providing for old-age

income is 8 to 10 percent more likely in democracies compared to autocratic regimes in the overall sample.

In column 3, I find evidence in line with hypothesis 2. While more fractionalized governments are less likely to provide social pension, socialist governments are associated with a positive probability to provide social pension. For government fractionalization the effect is only significant in column 5 at the 5 percent level. Higher government fractionalization is associated with weaker governments and a lower ability of fiscal deficit reduction (e.g., Roubini and Sachs, 1989a,b).¹¹⁸ Since social pensions are financed by general budgetary spending, the government may need to increase taxes. Evidence suggests that the higher government fractionalization, the lower the ability to raise taxes and increase revenues, because of lower political support (Perotti and Kontopoulos, 2002). This may translate into a lower probability of adoption of social pension. The marginal effect of the socialist dummy is significant at the 1 percent level. Note that in socialist governments compared to center and right-oriented governments the probability is 10 percent higher to provide social pension. This finding is in line with Keefer and Milanovic (2014) who find that left-oriented governments favor government provision of redistributive programs which seems to hold for social pension as well.

Finally, the importance of international factors for social pension adoption is analyzed. The results indicate that I can reject the hypothesis of leverage through international forces. A higher probability of social pension introduction is associated with less open countries. The magnitude of the effect shows that a 1 standard deviation increase in trade openness is associated with a 5 percent decrease in the probability of social pension provision. This is in contrast to expectations and suggests that there are indeed no policy transfer effects regarding non-contributory pension via commercial ties. Though, it could still be the case that it holds for contributory pension schemes. Presumably, countries may be forced to reduce their budget due to the diffusion of international crisis, which is easier in more open economies and demand austerity policies reducing public good provision and social pension. This effect can be observed

¹¹⁸ More fractionalized governments have also been found to have higher public spending and transfers (Volkerink and de Haan, 2001; Scartiscini and Crain, 2002; Bräuninger, 2005), this does not seem to translate in social pension provision.

in the current economic crisis. The AME of aid dependency is negative, but not significant at conventional levels, indicating that leverage through international financial support is not visible in the data. In sum, I find evidence for two hypotheses on democratic systems and the structure of government; however, I do not find evidence for international leverage through trade and aid.

Including alternative variables, that could be related to the probability of social pension adoption, tests for additional channels of influence. Since the increasing share of the elderly population should theoretically increase the probability of social pension provision, I use this variable instead of life expectancy in column 1 in Table III. 4. The AME has the right sign, but is not statistically significant at conventional levels. In column 2, the alternative measure of democracy provided by the Polity IV database is used (Marshall et al., 2014). This variable is a measure of democratic systems along three dimensions: regulation, competitiveness, and openness of executive recruitment; executive constraints; and regulation and competitiveness of political competition.

Table III. 4: Alternative variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Elderly Population	0.0083 (0.012)						
Democracy (Polity IV)		0.1349*** (0.050)					
Party fractionalization			-0.0606 (0.090)				
FDI/GDP				0.0036 (0.008)			
Globalization					0.0013 (0.003)		
ODA/GNI						-0.0004 (0.003)	
(ln) Gov. exp. pc							0.1246*** (0.034)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
#Obs	757	757	755	740	783	732	624
#Countries	136	136	136	136	138	130	132
pseudo R-squared	0.43	0.45	0.43	0.43	0.40	0.43	0.46
Wald test (p-value)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Log Likelihood ratio	-297.13	-288.25	-297.12	-289.17	-322.98	-284.96	-232.11

Notes: The dependent variable is a binary variable indicating if the country has a social pension. Average marginal effects reported. Standard errors in parentheses clustered at the country level.

Significance levels: * p<0.1, ** p<0.05, ***p<0.01. All models include time-period and region-income dummies as well as the full vector of controls of specification 5 in Table III. 3. Explanatory variables lagged by one period.

It is widely available and highly correlated with the indicator used in the main specification. It is scaled between 0 and 10 with higher values indicating the prevalence of sound democratic institutions to a larger extent. The dummy variable is 1 for values six or larger and 0 otherwise.¹¹⁹ The finding suggests that the result for democracy does not depend on the definition of the variable.

Looking at columns 3 to 6, other alternative variables are tested: party fractionalization, foreign direct investment (FDI) share, multidimensional globalization (Dreher, 2006; Dreher et al., 2008), and official development assistance (ODA) as a share of GNI¹²⁰. I find that a different specification of fractionalization focused on the legislature does not turn out to be relevant. However, since the initiation power to implement a social pension is largely located at the government level, the influence of government strength is more closely captured by employing government fractionalization. Using different measures for trade openness or aid dependency again does not support Hypothesis 3. Finally, in column 8 we test the influence of the size of government. We find a positive and significant relation, at the 5 percent level. Thus, higher government expenditure relate to a higher probability of social pension provision. This is not surprising since social pensions are part of government expenditures. Interestingly, the democracy effect and the savings effect vanish in this specification (not shown). This suggests that the size of the government is one channel through which democracies provide for social pension.¹²¹

As described before, different demographic trends are observed in developed and developing countries. In order to analyze whether these have an influence on the findings I introduce a dummy variable that is one if the country is a developing country following the income classification of the World Bank (2015) and interact it with the explanatory variables. Specifically, the dummy is 1 if the country has a yearly gross national income (GNI) per capita equal to or less than US\$4,125. In Table III. 5 the results for both countries groups are separately shown.

¹¹⁹ The cutting value is suggested by the authors of the indicator and has been used in the literature before (Marshall and Jagers, 2002; Rudra and Haggard, 2005).

¹²⁰ ODA/GNI differs from the aid to government expenditure measure in that it does not include financial flows to more advanced countries of Central and Eastern Europe (World Bank, 2014).

¹²¹ There is little evidence on whether democracies have larger government budgets than non-democracies. Theoretical predictions suggest the opposite (e.g., Mulligan et al., 2004 and references cited therein).

Not surprisingly I observe different important factors in the two groups. The average marginal effects for income and savings do not turn statistically significant for developed countries, whereas the AMEs of fertility and life expectancy are negative and statistically significant at the 1 percent level throughout all specifications for this country group. In accordance with the generally very low level of fertility and its decreasing trend in this country group this shows demand-driven implementation of social pension. In developing countries (lower panel), this does not seem to be the case. In this country group the income level is significantly related to social pension adoption where the effect is first increasing and then decreasing with rising income level and significant in three out of six specifications. Moreover, the savings rate is significantly and negatively related to the probability of social pension adoption. Contrary to developed countries, I find no systematic relation between fertility and the probability of social pension implementation. Presumably, a large part of the elderly population is still cared for through within-family transfers and the need for social pension is still lower. Given demographic trends (Figure III. 5), a rising demand is expected in the future.

Turning to the variables of interest, being a democracy seems to matter in the set of developing countries, whereas it is not systematically related to social pension adoption in the developed country sample. This also explains the difference to the result of Mulligan and Shleifer (2010), because they only look at developed countries and for this sample I also observe no difference between democracies and non-democracies. However, in democratic developing countries the probability of social pension adoption itself seems to be higher compared to non-democratic countries. The same holds for government fractionalization. The effect is not different from zero in developed but in developing countries. In the latter group the effect is not robust to the inclusion of additional variables in column 6. Finally, socialist governments are associated with a higher probability of social pension adoption in developed countries, but not in developing countries. I do not find any effect in the two groups regarding the size of governments (column 4). Contrary to expectations, more open countries and countries receiving more aid (developing countries) do have a lower probability of social pension provision. Presumably, these countries do not have enough capacity to provide social pension.

Table III. 5: Determinants of social pension (country groups)

	Developed countries					Developing countries						
	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
(ln) GDP pc	0.0548 (0.459)	0.0556 (0.464)	-0.3967 (0.409)	-0.3472 (0.460)	0.0461 (0.484)	-0.5088 (0.442)	1.9975*** (0.730)	1.3585* (0.808)	0.6749 (0.622)	1.0488 (0.707)	2.2354*** (0.860)	1.2481 (1.002)
(ln) GDP pc squared	0.0023 (0.029)	0.0028 (0.029)	0.0288 (0.025)	0.0244 (0.028)	0.0019 (0.031)	0.0349 (0.027)	-0.0986** (0.039)	-0.0671 (0.043)	-0.0317 (0.033)	-0.0468 (0.040)	-0.1101** (0.045)	-0.0611 (0.052)
Population growth	-0.0185 (0.020)	-0.0224 (0.020)	-0.0355 (0.024)	-0.0132 (0.020)	-0.0303 (0.021)	-0.0454* (0.025)	0.0128 (0.020)	0.0194 (0.020)	0.0097 (0.023)	-0.0345 (0.045)	0.0279 (0.025)	0.0362 (0.032)
Savings	-0.0011 (0.002)	-0.0012 (0.002)	-0.0012 (0.002)	-0.0012 (0.001)	-0.0012 (0.002)	-0.0015 (0.002)	-0.0085*** (0.002)	-0.0063*** (0.002)	-0.0085** (0.004)	-0.0102* (0.006)	-0.0084*** (0.003)	-0.0067 (0.005)
Fertility rate	-0.1654*** (0.047)	-0.1561*** (0.045)	-0.1727*** (0.048)	-0.2105*** (0.063)	-0.1746*** (0.049)	-0.1721*** (0.046)	0.0327 (0.035)	0.0375 (0.034)	0.0747 (0.062)	0.1757* (0.105)	0.0157 (0.037)	0.0414 (0.058)
Life expectancy rate	-0.0146*** (0.005)	-0.0148*** (0.005)	-0.0161*** (0.006)	-0.0170** (0.007)	-0.0156*** (0.006)	-0.0156*** (0.006)	0.0117 (0.008)	0.0105 (0.009)	0.0096 (0.015)	0.0141 (0.019)	0.0124 (0.010)	0.0053 (0.014)
Contributory pension	0.1565** (0.067)	0.1527** (0.067)	0.1915** (0.076)	0.0990 (0.084)	0.1624** (0.077)	0.1906** (0.075)	0.1565** (0.067)	0.1527** (0.067)	0.1915** (0.076)	0.0990 (0.084)	0.1624** (0.077)	0.1906** (0.075)
Democracy	-0.0004 (0.049)	-0.0004 (0.049)	0.0333 (0.039)	0.0342 (0.045)	0.0248 (0.037)	0.0248 (0.037)	0.067 (0.1588**)	0.1588** (0.066)	0.2671** (0.108)	0.1901 (0.141)	0.2963*** (0.102)	0.2963*** (0.102)
Gov. fractionalization	-0.1054 (0.075)	-0.1054 (0.075)	-0.1054 (0.075)	-0.1339* (0.079)	-0.1072 (0.073)	-0.1072 (0.073)	-0.2084* (0.126)	-0.2084* (0.126)	-0.2084* (0.126)	-0.2429* (0.133)	-0.1684 (0.110)	-0.1684 (0.110)
Party orientation (left)	0.1106*** (0.037)	0.1106*** (0.037)	0.1106*** (0.037)	0.1101** (0.046)	0.1208*** (0.036)	0.1208*** (0.036)	0.0092 (0.056)	0.0092 (0.056)	0.0192 (0.056)	0.0092 (0.059)	0.0091 (0.044)	0.0091 (0.044)
(ln) Gov. exp. pc				0.0090 (0.042)					-0.0087 (0.090)			
Trade share					0.0025** (0.001)	0.0023 (0.002)					-0.0010** (0.000)	-0.0011** (0.001)
Aid/Gov.exp.					0.0001 (0.000)	-0.0000 (0.000)					-0.0043*** (0.002)	-0.0057** (0.002)
other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of Observations	1205	1205	854	710	1150	821	1205	1205	854	710	1150	821
# of Countries	161	161	152	150	160	149	161	161	152	150	160	149
pseudo R-squared	0.42	0.43	0.45	0.47	0.42	0.47	0.42	0.43	0.45	0.47	0.42	0.47

Notes: The dependent variable is a binary variable indicating if the country has a social pension. Average marginal effects reported. Standard errors in parentheses clustered at the country level. Significance levels: * p<0.1, ** p<0.05, ***p<0.01. All models include time-period and regional dummies. Explanatory variables lagged by one period. Developing countries defined as maximum GNI per capita of US\$4,125 or lower, countries with a higher yearly GNI are classified as developed countries (World Bank classification, 2015).

Overall, different factors seem to matter differently in these two sub-samples. Demand is more important in developed countries while we find state capacity and strength of government to play a major role in developing countries.

Finally, the relationship between democratic regimes and social pension provision is scrutinized in more detail. First, it may be the case that there are not only differences in country groups, but that it also plays a role whether the democratic system is strongly established. I expect more established democracies to have a higher probability of social pension provision. In order to address this I use a measure of system tenure taken from the DPI data set (Beck et al. 2001) and interact it with the democracy dummy. Furthermore, I also investigate whether the effect of government fractionalization differs between democratic and non-democratic systems. Table III. 6 shows the AMEs for both interaction effects and Figure III. 6 displays the average marginal effects of democracy over system tenure and government fractionalization, respectively. Table III. 6 shows that the tenure of democracies is positively and statistically significant at the 1 percent level related to social pension adoption. Figure III. 6 the marginal effect turns significant when the system is strongly established for more than 30 years, indicating that established democracies have a higher probability of adopting social pension. For government fractionalization there is no differential effect in democracies.

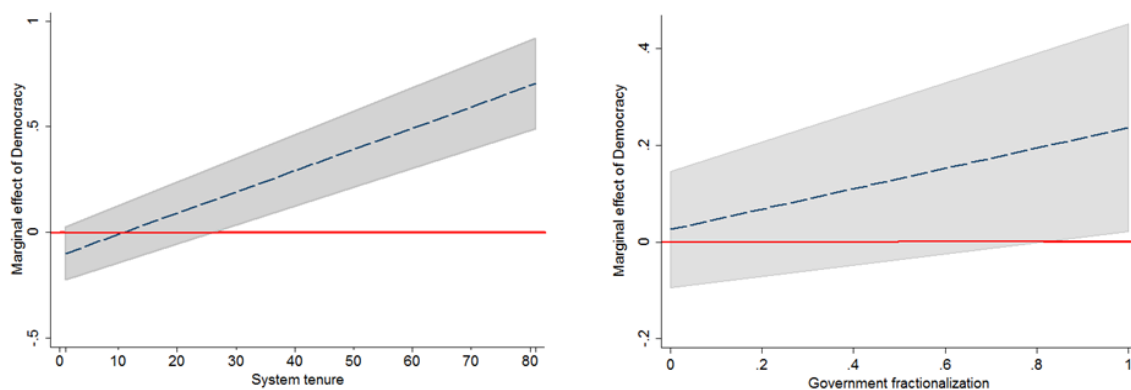
Table III. 6: Interaction effects

	(1)	(2)
Democracy	-0.4409*	0.1083
	(0.249)	(0.253)
Gov. fractionalization	-0.9108***	-1.5267***
	(0.336)	(0.520)
Gov.frac # Democracy		1.0434
		(0.671)
System tenure	-0.0477***	
	(0.015)	
System tenure # Democracy	0.0649***	
	(0.016)	
Controls	Yes	Yes
#Obs	821	821
#Countries	149	149
pseudo R-squared	0.41	0.39

Notes: The dependent variable is a binary indicator, whether the country has a social pension. Average marginal effects reported. Standard errors in parentheses clustered at the country level. Significance levels: * p<0.1, ** p<0.05, ***p<0.01. All models include time-period and regional dummies. Both specifications include the vector of controls of specification 5 Table III. 3 all lagged by one period.

Another aspect of non-linear models is that the marginal effects of interactions may be very heterogeneous at different observation levels and individually significant for a subset of observations. The average marginal effects hide this type of heterogeneity which may be of special interest if the effect switches sign. These non-linearities are

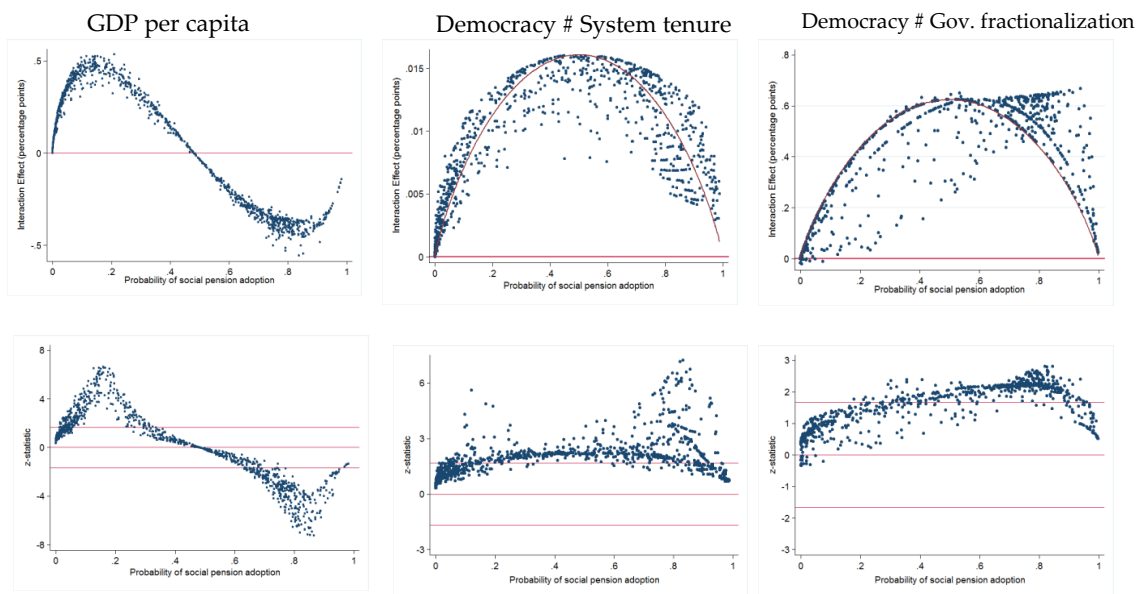
Figure III. 6: Marginal effects



Notes: The left figure shows the average marginal effect of democracy with increasing system tenure based on column 1 in Table III. 6 and the right panel shows the average marginal effect of democracy with increasing government fractionalization based on column 2.

analyzed for three interaction effects and the results are presented in Figure III. 7.¹²² The figure graphs the distribution of AMEs for the interaction terms of GDP per capita, system tenure and fractionalization both with democracy over the predicted probability of non-contributory pension adoption, as well as the associated z-statistic with the 95 percent confidence bands. The figure shows that all three interaction terms are clearly non-linear. Looking at the income level the effect includes positive and negative values in an S-shape: positive significant marginal effects in the form of an inverse U-shape relation at lower probabilities of social pension adoption and negative marginal effects at higher probabilities of social pension provision. The effect is positive and significant for around 29 percent of the observations. It is negative and significant for around 25 percent of the observations and ranges overall from -55 percent to 53 percent. This large share of significant results suggests that the income level is likely to be of some importance for the probability of social pension adoption. I have shown before that this seems to be especially relevant in developing countries.

Figure III. 7: Effect of interaction terms in probit models



Notes: The upper panel shows the non-linear partial effects of GDP per capita and democracy depending on system tenure or government fractionalization on the probability of social pension adoption. In the lower panel the respective z-statistics with a 95 percent confidence band are displayed (cut-off values +/- 1.96).

¹²² The routine of Norton et al. (2004) is used to analyse the non-linear effect of GDP per capita.

The interaction effect of democracy and system tenure is inverse U-shaped throughout the distribution. The marginal effect is positive and significant for 51 percent of the predicted observations observing an increase in the effect for lower probabilities of social pension adoption and decreasing marginal effects at higher levels of adoption probability. The AMEs range from 0 to 16 percent. Clearly the large share of significant values indicates that the age and establishment status of the democratic system matter for the provision of public old-age pension. This would explain the low coverage in many developing countries, where besides low state capacities the political system is not mature enough to provide public funds for the elderly. Turning to the interaction of democracy with government fractionalization, again the marginal effects are distributed in a U-shape. A fraction of 43 percent is individually significant at the 5 percent level. The effect ranges from -2 to 66 percent and thus is quite large which explains the null finding on average. However, the marginal effect also suggest that only for very high levels of fractionalization, which is rarely observed in the data the effect would turn positive and significant.

The results show the relevance of economic and demographic variables. Efficiency concerns are more important for social pension adoption in developing countries, whereas demographics, and thus the demand to provide public funds, rather drive social pension introduction in developed countries. Furthermore, the adoption is shaped by the political system and its structure. This lends support to Hypotheses 1 and 2. I find support for the notion that democracies have a higher probability of social pension provision (*H1*). This is especially relevant in developing countries. The probability increases with the stability of the system. The results also suggest a supporting role of the political system and its structure (*H2*). On the one hand, the higher the government fractionalization the lower seems to be the probability of non-contributory pension provision, indicating that weaker governments especially in developing countries are less like to provide against old-age poverty. On the other hand, the results point to a higher probability in the provision of social pension in socialist governments especially in developed countries. Third, there is no evidence in the data that international leverage through trade or aid influences the provision of social pension at the national level.

Although the topic is very present on the global governance agenda, the relation to national legislation is weak.

III. 5. CONCLUSIONS

In this paper I investigate, first, the distribution of pension programs around the world with a focus on social pensions. These anti-poverty cash transfer pensions are defined in accordance to the World Bank zero pillar pension as non-contribution-based pensions provided in the form of targeted (means-tested) or universal funds (Holzman and Hinz, 2005). So far, this paper is the first to broaden the view beyond contribution-based pensions including information on the provision of social pension in developed and developing countries.

Second, I focus on whether social pensions are determined by economic and demographic factors, the political system and its structure, and through international leverage. I use duration adjusted probit models to disentangle the role of the socio-economic conditions, of political institutions and international relations to social pension provision. In contrast to the existing literature that mainly focusses on spending behaviour and to a large extent on OECD countries, explicit formal hypotheses are developed and tested in a large set of countries.

The results show that economic and demographic factors matter for different country groups. In countries where traditional support structures break down, the probability of implementation increases. This can be attributed to decreasing fertility rates and increases in life expectancy. In contrast, state capacity measured by the income level and savings are systematically related to the adoption of social pension in low income countries. Compared to autocratic regimes, democracies have a higher probability of social pension introduction foremost in developing countries, but they need to be stable and established for at least three decades for the effect to be systematically visible. While in more fragmented governments the chance of social pension adoption decreases, this seems to be foremost the case in developing countries, but driven by a small part of the sample. Socialist governments are more inclined in state interventions which supports the probability of social pension provision in developed countries.

In terms of policy implications I provide evidence that demand for tools against old-age poverty will increase. Since only around 50 percent of countries worldwide provide their elderly with a public non-contribution based pension there is still leeway for countries to increase their social protection. However, especially for developing countries this might only be affordable if the income level increases and participatory government systems are strongly established. International actors are not found to influence national decision making processes through commercial ties or aid provision. However, there might be other channels through which such support is possible which we did not identify in this study.

A next step in this line of research will be the analysis of the effectiveness of social pensions in terms of coverage rates and success in decreasing old-age poverty. Both aspects are not covered here due to scarce data availability. Furthermore, the availability of more data will allow for the application of additional techniques and a more in depth analysis of endogeneity concerns. Nevertheless, our findings show systematic evidence of important factors shaping the provision of public redistributive policies.

APPENDIX III

Table A III. 1: Summary statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Social pension	1205	0.371	0.483	0	1
(ln) GDP pc	1205	8.516	1.207	5.49	11.73
Population growth	1205	1.740	1.364	-4.64	15.51
Savings	1189	17.925	15.389	-80.93	83.23
Fertility rate	1203	3.796	2.002	0.87	8.42
Life expectancy	1203	64.752	11.371	21.78	83.29
Contributory pension	1205	0.880	0.325	0	1
Democracy	1205	0.422	0.494	0	1
Gov. fractionalization	959	0.200	0.253	0	1
Trade share	1193	80.484	50.561	8.42	442.64
Elderly population	1195	6.276	4.324	1.24	21.04
AID/Gov.exp.	1136	35.365	59.504	-0.96	623.73
Party orientation (left)	1205	0.234	0.424	0	1
System tenure	1028	20.447	19.043	1	82
Democracy (Polity2)	1205	0.426	0.495	0	1
Fractionalization	956	0.510	0.271	0	1
FDI/GDP	1089	3.488	5.601	-17.51	66.15
Globalization	1132	49.342	17.993	13.09	92.30
ODA/GNI	1124	4.875	7.774	-0.12	93.17
(ln) Government expenditure	936	6.117	1.809	1.25	9.55

Notes: Summary statistics include number of observations (Obs.), mean, standard deviation (Std. Dev.), minimum (Min.) and maximum (Max.) of the respective variable.

Table A III. 2: Variables and sources

Variable	Description	Source
Social (non-contributory) pension	Dummy variable that takes the value 1 if the country has a social (non-contributory) pension, 0 otherwise.	ILO (2014)
Contributory pension	Dummy variables that is 1 if the country has a retirement scheme based on earnings and contribution or a provident fund; 0 otherwise.	ILO (2014)
(ln) GDP pc	Natural logarithm of real GDP per capita at chained Purchasing Power Parities (constant 2011 US\$).	Penn World tables 8.1 (2014)
Fertility rate	Fertility rate is the rate of all births per woman	WDI (World Bank, 2014)
Life expectancy	Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.	WDI (World Bank, 2014)
Savings rate	Gross domestic savings are calculated as GDP less final consumption expenditure (total consumption), plus net transfers.	WDI (World Bank, 2014)
Elderly population	Total population 65 and older as share of total population.	WDI (World Bank, 2014)
Democracy	Dummy variable that is one if electoral determination of executive and legislative offices are existent; 0 otherwise.	Cheibub et al. 2010
Party orientation (left)	Dummy that is one for a left oriented government and zero if right or center oriented. Based on Chief Executive Party Orientation; Right (1); Left (3); Center (2); No information (0).	Beck et al. (2001) updated Jan. 2013
Government fractionalization	The probability that two deputies picked at random from among the government parties will be of different parties. Equals NA if there is no parliament.	Beck et al. (2001) updated Jan. 2013
Party fractionalization	The probability that two deputies picked at random from the legislature will be of different parties. Equals NA if there is no parliament.	Beck et al. (2001) updated Jan. 2013
Trade share	Trade is the sum of exports and imports of goods and services measured as share of GDP.	WDI (World Bank, 2014)
Globalization	Multidimensional index: economic, political and social globalization: 1 (not globalized) – 100 (fully globalized).	Dreher 2006, Dreher et al. (2008); Version 2013.
AID/Gov. expenditure	Net official development assistance and official aid received as share of total government's expenses.	WDI (World Bank, 2014)
ODA/GNI	Net official development assistance (ODA) received (% of GNI).	WDI (World Bank, 2014)
Democracy (Polity 2)	Institutionalized democracy along three dimensions: regulation, competitiveness, and openness of executive recruitment; executive constraints; and regulation and competitiveness of political competition.	Marshall et al. (2014)
System tenure	Reports the number of years the country has been autocratic or democratic.	Beck et al. (2001) updated Jan. 2013

Table A III. 3: List of countries per region (N = 214)

Region	Country	Region	Country	Region	Country	Region	Country
Europe & Central/Asia	Albania	East Asia & Pacific	American Samoa	Latin America & Caribbean	Antigua and Barbuda	Sub-Saharan Africa	Angola
	Andorra		Australia		Argentina		Benin
	Armenia		Brunei Darussalam		Aruba		Botswana
	Austria		Cambodia		Bahamas, The		Burkina Faso
	Azerbaijan		China		Barbados		Burundi
	Belarus		Fiji		Belize		Cabo Verde
	Belgium		French Polynesia		Bolivia		Cameroon
	Bosnia and Herzegovina		Guam		Brazil		Central African Republic
	Bulgaria		Hong Kong SAR, China		Cayman Islands		Chad
	Channel Islands		Indonesia		Chile		Comoros
	Croatia		Japan		Colombia		Congo, Dem. Rep.
	Cyprus		Kiribati		Costa Rica		Congo, Rep.
	Czech Republic		Korea, Dem. Rep.		Cuba		Cote d'Ivoire
	Denmark		Korea, Rep.		Curacao		Equatorial Guinea
	Estonia		Lao PDR		Dominica		Eritrea
	Faeroe Islands		Macao SAR, China		Dominican Republic		Ethiopia
	Finland		Malaysia		Ecuador		Gabon
	France		Marshall Islands		El Salvador		Gambia, The
	Georgia		Micronesia, Fed. Sts.		Grenada		Ghana
	Germany		Mongolia		Guatemala		Guinea
	Greece		Myanmar		Guyana		Guinea-Bissau
	Greenland		New Caledonia		Haiti		Kenya
	Hungary		New Zealand		Honduras		Lesotho
	Iceland		Northern Mariana Islands		Jamaica		Liberia
	Ireland		Palau		Mexico		Madagascar
	Isle of Man		Papua New Guinea		Nicaragua		Malawi
	Italy		Philippines		Panama		Mali
	Kazakhstan		Samoa		Paraguay		Mauritania
	Kosovo		Singapore		Peru		Mauritius
	Kyrgyz Republic		Solomon Islands		Puerto Rico		Mozambique
	Latvia		Thailand		Sint Maarten (Dutch part)		Namibia
	Liechtenstein		Timor-Leste		St. Kitts and Nevis		Niger
	Lithuania		Tonga		St. Lucia		Nigeria
	Luxembourg		Tuvalu		St. Martin (French part)		Rwanda
	Macedonia, FYR		Vanuatu		St. Vincent and the Grenadines		Sao Tome and Principe
	Moldova		Vietnam		Suriname		Senegal
	Monaco		Algeria		Trinidad and Tobago		Seychelles
	Montenegro		Bahrain		Turks and Caicos Islands		Sierra Leone
	Netherlands		Djibouti		Uruguay		Somalia
	Norway		Egypt, Arab Rep.		Venezuela, RB		South Africa
	Poland		Iran, Islamic Rep.		Virgin Islands (U.S.)		South Sudan
	Portugal		Iraq		Bermuda		Sudan
	Romania		Israel		Canada		Swaziland
	Russian Federation		Jordan		United States		Tanzania
	San Marino		Kuwait		Afghanistan		Togo
	Serbia		Lebanon		Bangladesh		Uganda
	Slovak Republic		Libya		Bhutan		Zambia
Slovenia	Malta	India	Zimbabwe				
Spain	Morocco	Maldives					
Sweden	Oman	Nepal					
Switzerland	Qatar	Pakistan					
Tajikistan	Saudi Arabia	Sri Lanka					
Turkey	Syrian Arab Republic						
Turkmenistan	Tunisia						
Ukraine	United Arab Emirates						
United Kingdom	West Bank and Gaza						
Uzbekistan	Yemen, Rep.						

Notes: Classification according to the World Bank (World Bank, 2014).





CHAPTER IV

**HOW DOES GLOBALIZATION AFFECT ECOLOGICAL PRESSURES?
A ROBUST EMPIRICAL ANALYSIS USING THE ECOLOGICAL
FOOTPRINT**

with Lukas Figge (Maastricht University)

Keywords: Ecological Footprint, globalization, EBA, environment, climate change

JEL classification: Q57, F64, O13

IV. 1 INTRODUCTION

“A long term correlation between the recent processes of globalization of international markets and environmental degradation is quite evident [... and ...] so uncontroversial that, for the sake of brevity, we do not need to document it here.”

(Borghesi and Vercelli, 2003)

According to Borghesi and Vercelli there seems to be no doubt about the degrading impact of economic globalization on the global environment. However, there are also competing claims that *“globalization is in fact good for the environment”* (Stern, 2004: 1428). Scholars from various disciplines acknowledge that there is a connection between globalization and the (global) environment, yet, empirical evidence is largely missing. However, this hides the fact that the true relationship may be more complex. The objective of the paper is to close this gap and provide a comprehensive analysis of what drives human environmental demands taking the multidimensionality of globalization into account.

Broadly defined, globalization is *“the growing interconnectedness and inter-relatedness of all aspects of society”* (Jones, 2010). Previous work on the relationship between environmental pressures and globalization in many cases assesses one single dimension of globalization such as the level of trade openness and focuses on singular aspects of human demands and environmental pollutants (Antweiler et al., 2001; Cole, 2004; York et al., 2003; Dreher et al., 2008; Lamla, 2009). In both cases the complexity of the concepts is neglected. However, for some time now, multi-dimensional and more holistic indicators of both phenomena provide the possibility to systematically assess the complex relationship and to investigate whether globalization has an unambiguously increasing effect on human demands on the environment.¹²³

Currently the most widely used measure for human ecological demands is the Ecological Footprint (EF) (Wackernagel and Rees, 1996). Three basic characteristics make it widely applicable: first, it takes a universal perspective on environmental externalities and

¹²³ Throughout the paper we use ecological pressures and human demands interchangeably capturing environmental degradation through human impact.

pressures. Second, it compares human demands placed on the environment by countries and highlights the differences in levels of resource consumption between them (Jorgenson and Clark, 2011); and third, it quantifies the amount of biologically productive land that is required for consumption, production, imports and export of natural resources and absorption of carbon dioxide emission of a given population (Global Footprint Network, 2012a). Together with a measure of globalization that captures the globalization level of countries along three dimensions – economic, political, and social globalization (Dreher, 2006; Dreher et al., 2008), we advance beyond one-dimensional considerations. To the best of our knowledge no study has yet analyzed the relationship between globalization as a multidimensional process and ecological pressures allowing for the complexity of global environmental change.¹²⁴ A better (empirical) understanding of the determinants of human demands on ecosystems, with a special focus on the role of globalization is the pre-requisite for effective mitigation.

While we draw on previous research on the drivers of ecological pressures and human demands, we contribute new insights by first, considering a variety of determinants and identifying whether they are robust to including other conditioning variables. For that we apply a variant of the Extreme Bounds Analysis (EBA) suggested by Sala-i-Martin (1997), Sturm and De Haan (2005) and Gassebner et al. (2010b) and test various demographic, economic, and political economy variables that have been suggested to affect environmental stressors. Second, since we broaden the concept of globalization we add to the quantitative literature on consequences of globalization (Dreher et al., 2008; Potrafke, 2014). In the empirical analysis, we construct a panel data set of 146 countries that allows us to exploit the time dimension of the variables and investigate the relationship over the 1981-2009 period in a fixed-effects setting considering cross-section interdependence.

To foreshadow our results: income, technology and population are the main drivers as suggested by theory. The EBA reveals that besides the latter three a larger vector of controls

¹²⁴ In their book on the consequences of globalization Dreher et al. (2008) analyse the influence of the globalization index on air and water pollution and also distinguish between the three dimensions of globalization. However, they focus on contemporaneous effects and do not consider human ecological pressures.

is robustly related to ecological pressures. The relationship to globalization, however, is less clear than previously assumed; it is rather distinct depending on the aspect of globalization and perspective of human demands. Globalization is positively associated with the human demands of trade increasing the EF of exports and imports, while having no unambiguous correlation to the other two components of Ecological Footprint (consumption and production). We do not find any systematic evidence for the impact of political globalization, whereas on social globalization we find indication for both negative (awareness increasing) and positive (obliviousness) coefficients depending on the pressure. For economic globalization the findings suggest a positive enhancing correlation especially in production – and trade – induced pressures.

The remainder of this last chapter is structured as follows. In Section IV. 2 we explain the concept of human ecological pressures and use the existing literature on drivers of ecological pressures to identify relevant variables tested on the EBA. Then we present our measure of globalization and develop testable hypotheses. In Section IV. 3 we describe the estimation strategy including the EBA and our hypotheses tests. The results are presented in Section IV. 4 before we discuss sensitivity tests and address potential endogeneity concerns that might bias our results. In Section IV. 5 we conclude.

IV. 2 HUMAN DEMANDS ON THE ENVIRONMENT AND GLOBALIZATION

In the recent era of “Great Acceleration” which took off in the second half of the 20th century humans have become the single dominating driving force for global environmental changes, transgressing planetary boundaries and thereby coining a new geological epoch, the Anthropocene (Crutzen, 2006; Rockström et al., 2009; Steffen et al., 2005; Steffen et al., 2015a; Steffen et al., 2015b). Human demands alter ecosystems by creating ecological pressures such as land-use changes, resource extraction and depletion (e.g., deforestation and overfishing), emissions of waste and pollution and the modification and movement of organisms (Steffen et al., 2005; UNEP, 2012a). The resulting environmental impacts include, but are not limited to climate change, ozone depletion, land degradation, loss of biodiversity, pollution, and acid rains. Consequences affect primarily the very poor and

vulnerable populations in developing countries through famine, water shortages, and competition over resources, among others (IPCC, 2014). Measurements of such environmental footprints allow the quantification of human environmental demands.

Both human environmental demand and globalization are phenomena that include various dimensions making a one-sided assessment through single stressors (e.g., CO₂ pollution) or considerations (e.g., trade) prone to omitted variables bias. The availability of holistic indicators in both cases thus has the advantage of addressing various dimensions simultaneously without risking problems of multicollinearity in the empirical analysis. In this respect we use Ecological Footprint data provided by the Global Footprint Network (2012a) and a multidimensional measure of globalization including political, economic and social globalization (Dreher, 2006; Dreher et al., 2008).

IV. 2.1 The Ecological Footprint of nations

The Ecological Footprint that addresses a whole set of human demands on the environments “measures how much area of biologically productive land and water¹²⁵ an individual, population or activity requires to produce all the resources it consumes and to absorb the waste (carbon dioxide) it generates, using prevailing technology and resource management practices” (Global Footprint Network, 2012b).¹²⁶ Different Environmental Footprint types are available.¹²⁷ Best known is the Ecological Footprint (EF). It is currently the most complete indicator to assess aggregated human demands on ecosystems for several reasons: first, the aggregation is based on six bio-productive land-use types: i) cropland, ii) grassland and pasture (food and fiber), iii) fishing grounds (seafood), iv) forest land (timber and paper products) as well as v) areas required to build infrastructure (e.g., roads and buildings), and vi) land for carbon sequestration. Figure IV. 1 shows the global evolution of

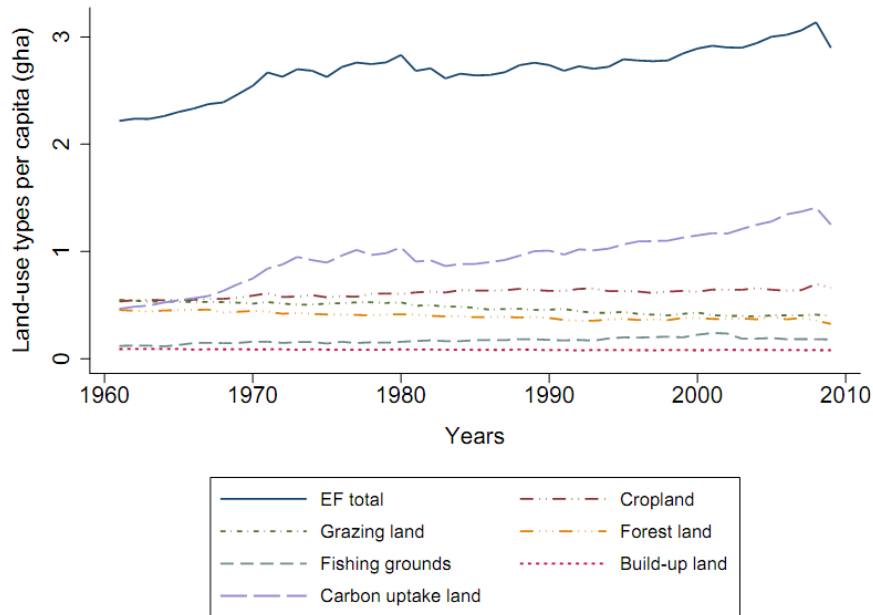
¹²⁵ Definition of biologically productive land and water: the land and water (both marine and inland waters) area that supports significant photosynthetic activity and the accumulation of biomass used by humans. Non-productive areas as well as marginal areas with patchy vegetation are not included. Biomass that is not of use to humans is also not included, from the online GFN Glossary.

¹²⁶ We use the 2011 edition of the National Footprint Accounts from the Global Footprint Network (2012a) in the empirical analysis.

¹²⁷ E.g., ecological water or carbon footprints are another form of quantification of ecological pressures (Galli et al., 2012; Hoekstra and Wiedmann, 2014).

each land-use type over time. Note that since the 1970s land area equivalent to carbon sequestration shows a different development compared to the other components with more variation and an upward sloping trend. This suggests that carbon up-take might relate differently to impact factors than the other five land-use types. We will also test this in the empirical analysis by splitting the EF in carbon and non-carbon measures in Section IV. 4.3.

Figure IV. 1: Development of EF components



Notes: EF total refers to Ecological Footprint of consumption.¹²⁸

Second, the indicator is globally comparable. The EF is measured in global hectares (gha) which do not only refer to a physical area, but also take its ecological productivity into account.¹²⁹ Third, the Ecological Footprint is scientifically rigorous (based on input-output tables) and widely accepted across the social sciences, including ecological economics (Jorgenson and Clark, 2011). Further, it is commonly used and employed in policy reports, such as the Global Environment Outlook (UNEP, 2012a) and the yearly Living Planet Report (WWF, 2014). Data are available for 240 countries and territories for the years 1961-2009

¹²⁸ All components are measured in global hectares (gha) taking physical land and its productivity into account (Global Footprint Network, 2012b).

¹²⁹ For more detailed information on the exact calculation methodology we refer to Borucke et al. (2013).

covering most of the “Great Acceleration” period. Finally, the National Footprint Accounts (NFA) takes the effects of trade flows into account, by reporting Ecological Footprints from different perspectives, composed of production, imports and exports in the following form:

$$EF_{consumption} = EF_{production} + EF_{imports} - EF_{exports}$$

We use each of these footprints separately in the empirical analysis. This disaggregation allows us to disentangle the influence of globalization on several aspects of ecological demands. Since we find a simple positive correlation between the EF of consumption and overall globalization, it is not only important to analyze whether this holds controlling for confounding factors, but also how different perspectives of the Ecological Footprint are affected separately.

Besides its general relevance, the EF also has some limitations. According to Galli et al. (2012) the major limitation of the EF is that it is not geographically explicit, meaning that it does not assign exact localities of environmental pressures, but aggregates only at the country level disregarding sub-national levels. This is of minor relevance to our study, since we are interested in the global perspective across countries. A second aspect regularly mentioned is that pollutants and wastes such as phosphorus and nitrogen, nuclear waste and greenhouse gases (GHGs) other than carbon dioxide, which also have environmental impacts, are not included in the calculation. While aggregating various demands, the EF still only gives a partial picture of the problem and thus is not a catch-all sustainability indicator. This needs to be taken into account in the interpretation of our results. Footprints in general do not say anything about actual state changes in ecosystems or impacts on humans. They indicate the extent of human demands on ecosystems, but do not measure actual environmental quality, change, impact, or resource depletion. Any analysis thus needs to consider country specific environmental characteristics separately. In our empirical assessment we address this by using country fixed-effects and control for underlying country characteristics that do not vary over time. Last, as pointed out by Borucke et al. (2013), National Footprint Accounts (NFAs) are a conservative measure of environmental pressures and are specifically constructed to underestimate EFs and overestimate

biocapacity.¹³⁰ This is rather an advantage in a quantitative approach as ours, because it makes sure that if we find effects they are truly influential in explaining the variation. Various papers have used the EF to investigate the drivers of ecological demand. We review the most important ones and identify a vector of control variables.

IV. 2.2 Drivers of ecological pressures

Two major relevant strands of the literature provide insights into the drivers of ecological pressures: environmental sociology and environmental and ecological economics. Environmental sociologists quantitatively analyze the determinants of the Ecological Footprint by referring to the “IPAT notion.” This states that environmental impacts in a nation (I) are determined by the size and composition of the population (P), the level of affluence (A) and the state of technology (T) (York et al., 2003; Rose et al., 2004; Dietz et al., 2007). These factors are identified by theories of societal modernization drawing on the current debate about the Anthropocene. They find an intensification of human demands as the income level increases in a U-shaped relationship (see, e.g., Dietz et al., 2012; Jorgenson and Clark, 2011). Dietz et al. (2007), Rosa et al. (2004), and York et al. (2003) consistently show a population elasticity being close to one and positive.¹³¹

Environmental and ecological economists center on the discussion of an inversed u-shaped Environmental Kuznets Curve (EKC) for various aspects of environmental quality and respective pollutants (Copeland and Taylor, 2004; Dinda, 2004; Gallagher, 2009b). This strand of literature focuses strictly on the relationship between income and single environmental indicators (mostly air and water pollution). Following the EKC argument the standard of living – measured by GDP per capita – is the main determinant of

¹³⁰ The reason stated for this approach is to “yield conservative estimates of global overshoot” (p. 532). In case of the EF this becomes clear in its composition, because for instance only CO₂ emission is included in the calculation as explained above.

¹³¹ If more variables are tested the results are generally ambiguous (e.g., Jorgenson et al., 2010; Jorgenson and Rice, 2005; Jorgenson et al., 2005). A variety of approaches without addressing robustness concerns is used: Dietz et al. (2007), Rosa et al. (2004), York et al. (2003), Jorgenson, (2003, 2004, 2005) employ cross-sectional analysis, whereas Jorgenson and Clark (2011), Jorgenson et al. (2010), Jorgenson and Rice (2005) and Jorgenson et al. (2005) use panel data, but rely on averaged observations or a very short period of time. Moreover, these studies disregard multi-dimensional aspects of globalization and mainly consider partial aspects of it such as trade (Jorgenson and Clark, 2009).

environmental quality, but after reaching a certain threshold or turning point, further increases in income decrease pollution. However, the empirical evidence for the EKC is mixed (Copeland and Taylor, 2004; Dinda, 2004).¹³² Phrased differently, mixed findings suggest opposing trends: as countries with higher income on average reduce the emissions they produce locally, but because they do not consume fewer goods which are produced with high carbon intensity, the production of these goods is simply outsourced to other countries with lower income (grey imports). The products then find their way back to the outsourcing country as import goods. We thus consider the income-consumption relationship more meaningful than the income-production relationship with the Ecological Footprint as adequate measure. Looking at ecological demands of countries thus corresponds to the actual impact of a country's consumption and to its contribution to pressures on the global environment.

Both strands of the literature guide us in the choice of control variables for the empirical analysis that are important for ecological pressures. Interestingly, they differ in one major aspect: while the IPAT identity strongly suggests explicit treatment of the technological dimension, many empirical studies and theoretical findings regarding the EKC so far primarily focus on income per capita, without explicitly including a proxy for technology use. The assumption is that the technological dimension operates through income and therefore no explicit treatment is necessary (Copeland and Taylor, 2004; Gallagher, 2009b; Gassebner et al., 2010b). Nevertheless, disentangling impacts on the environment makes a formal treatment of technology necessary considering scale effects, composition effects and technique effects. The assumption behind this separation is that technological development results in more efficient production processes (scale effect) which require fewer inputs (natural resources) and produce less emission for the same amount of output (composition effect), thereby decreasing the demands on the environment through the technique effect (Grossman and Krueger, 1995). We expect globalization to affect ecological pressures in addition to these impacts, since globalization is a broad,

¹³² A more detailed overview of studies investigating the EKC relationship is provided by Gallagher (2009).

multidimensional concept capturing global developments and interactions that go beyond economic growth, technology use, and population or simple acknowledgement of international trade.

IV. 2.3 Measuring globalization

The KOF index of globalization, our “globalization” measure of choice, includes economic, political and social globalization (Dreher, 2006; Dreher et al., 2008); to measure globalization in a consistent way across countries and over time.¹³³ Other indices trying to capture globalization have the disadvantage of being only available for a small group of countries, i.e., OECD countries (Andersen and Herbertsson, 2005; Lockwood and Redoano, 2005) or are just available for a few points in time like the Maastricht Globalization Index (MGI), recently updated by Figge and Martens (2014).

The index covers 187 countries for the years 1970-2009, and allows us to disentangle the effect of different dimensions of globalization. The overall index is composed of 23 variables grouped in the three dimensions. Economic globalization includes variables on actual flows such as trade, FDI and capital flows. Restrictions include hidden import barriers, tariffs, taxes on international trade and capital controls. Social globalization cumulates variables on personal contacts such as telephone traffic and international tourism, information flows including internet, newspapers and newspaper availability, and cultural proximity.¹³⁴ The third dimension of political globalization includes the number of embassies in the country, membership in international organizations and ratification of international treaties as well as participation in U.N. Security Council missions.¹³⁵ The overall as well as the disaggregated sub-dimensions are scaled between 1 and 100, where 1 indicates a low level of globalization and 100 is the highest level of globalization. All four indicators are widely used in the literature (see, Potrafke, 2014, and citations therein). We

¹³³ The 2013 version of the KOF index is applied, available at: <http://globalization.kof.ethz.ch/>.

¹³⁴ The latter includes variables such as the number of McDonald’s restaurants and IKEA stores in the country and thus rather captures westernization and no other kinds of social globalization, like Islamic globalization. This has to be taken into account when interpreting the results.

¹³⁵ All variables included and their weights are detailed in Table A IV. 1 in Appendix IV.

use the overall index as well as the three sub dimensions to test our hypotheses, which are developed in the next section.

IV. 2.4 Effects of globalization

First evidence about the relationship between globalization and the natural environment is provided by Dreher et al. (2008). The authors show that globalization is positively correlated with a decrease in air and water pollution which holds for the economic, social and political dimension. We broaden this analysis by employing the different variants of the Ecological Footprint.¹³⁶ The two studies that are closest to ours are the ones by Lamla (2009) and Gassebner et al. (2010b). Lamla (2009) investigates robust determinants of pollution (carbon dioxide, sulfur dioxide and biochemical oxygen demand) and considers, among other factors, overall globalization as explanatory variable. However, he does not disentangle the different dimensions of globalization and focuses on long-term effects by considering cross-country differences.¹³⁷ In contrast we analyze explicitly the different dimensions of globalization and focus on the immediate impacts on ecological pressures for a country. Gassebner et al. (2010b) focus on the EKC relationship of the same pollutants. They find that variables capturing the economic structure of a country robustly and positively relate to air and water pollution. We now disentangle the relation between ecological demand and the three dimensions of globalization – economic, political and social globalization – and thus advance beyond simple economic arguments.

Economic Globalization

We would expect economic globalization through trade relations and the lowering of trade barriers to be important in the relationship to environmental stressors through its externalities of production. However, a priori the effect is not clear. It may have alleviating effects on ecological demands. For instance, foreign direct investments (FDI) may lead to technology transfer and thereby diffuse clean production technologies allowing developing

¹³⁶ In addition, the authors include each aspect of globalization in separate regressions which impedes the comparability between these dimensions.

¹³⁷ He finds differing correlations for different pollutants in the long-run: for carbon dioxide positive, sulphur dioxide negative and biochemical oxygen demand negative (Lamla, 2009).

countries to leapfrog less efficient production processes (Gallagher, 2009b; Tamazian et al., 2009; Tamazian and Rao, 2010). Global market integration, the argument goes, may then improve the allocative efficiency of domestic markets and promote private property and thereby contribute to internalization of ecological externalities (Dinda, 2004). Therefore, our 'markets for the global environment' hypothesis suggests that economic globalization decreases ecological demands.

On the contrary, considering the 'displacement and pollution haven hypothesis', economic globalization leads to growth of more pollution-intensive industries in countries with lower environmental regulations, which is the case in many developing countries (Copeland and Taylor, 2004). Generalized to all countries this translates into an 'intensification' hypothesis that expects economic globalization to intensify ecological demands in all countries and is based on four observations: first, there is currently no effective (global) framework for governing land-use and carbon emissions, which would allow for globally binding regulations. Second, more developed countries rather intensify agricultural production and their energy use which increases ecological stressors (UNEP, 2012a). Third, economic globalization may contribute to a 'race to the bottom' (Dinda, 2004), where countries that are more globalized economically through trade and investment are also more likely to avoid footprint mitigation in order to safeguard economic objectives. We expect the second line of argumentation more relevant given previous studies and ambiguous observations regarding the diffusion of cleaner technology.

Political globalization

Political integration ties states to each other through bilateral diplomatic contacts and within international organizations and agreements. A country is considered more politically globalized if it participates more in UN activities, is a member in international organizations (Dreher 2006) such as the United Nations Environment Program (UNEP)¹³⁸ and signatory to international treaties such as the Kyoto protocol. These international initiatives aim at

¹³⁸ This is just one example in the context of global environmental governance, other international organizations such as the World Trade Organisation (WTO) or the International Monetary Fund (IMF) that are not focused on environmental issues are also considered in the measure.

establishing a global framework to manage human demands on the environment.¹³⁹ The evidence on whether closer political integration may reduce human demands on the environment is rather mixed (Lemos and Argaval, 2006). Up until now no strictly enforceable global framework for greenhouse gas emissions is in place. Studies show that the Kyoto protocol was not able to effectively tackle climate change (e.g., den Elzen and de Moor, 2002) and it is still not clear whether the United Nations Framework Convention on Climate Change (UNFCCC) is capable of producing an effective successor. When it comes to global environmental issues other than climate change, measurable progress has only been made with respect to stratospheric ozone and lead in gasoline. Progress on other environmental issues such as deforestation, desertification or overfishing is mostly lagging behind (UNEP, 2012b). It, thus, seems that global governance still lags behind in managing adverse environmental effects of economic development.¹⁴⁰ Considering the structure of global politics and governance it exposes nations and people to institutions and structures suffering from lack of democracy, accountability and transparency. This, as argued by critics, may contribute to power abuses (Grant and Keohane, 2005)¹⁴¹ and potential adverse ecological effects, because for instance more attention is put on investment goals than on environmentally sustainable production and trade. This suggests a 'global environmental governance failure' hypothesis predicting a positive correlation between political globalization and the EF.

On the other hand, Lemos and Argval (2006) conclude that political integration has beneficial effects on the capacity and effectiveness of governance institutions to mitigate human demands on the environment. Countries that are more politically integrated, the argument goes, benefit from their access to global institutions, know-how and monitoring

¹³⁹ International environmental regimes included more than 1700 multilateral and bilateral environmental agreements as of 2006 (Lemos and Argaval, 2006), the Kyoto protocol being just one example (United Nations, 1998).

¹⁴⁰ Newell (2001) provides an overview of different regulation approaches of multinational companies focusing on environmental initiatives and shows that surveillance of such private global actors is difficult because heavy polluters seem difficult to capture.

¹⁴¹ Evidence is provided by Dreher (2009) on vote trading in the United Nations Security Council for IMF loans.

systems. Also, political cooperation often aims at building institutional capacity which advances social institutions for environmental regulation and facilitates negotiations. Rather than a race to the bottom, there may also be a rising of the bottom by disseminating environmental governance to developing countries (Dinda, 2004). In balance a 'global environmental governance' hypothesis suggests that political globalization decreases ecological pressures and human demands though theoretical arguments could explain a null effect if the opposing effects compensate for different institutions.

Social globalization

Social globalization exposes people and nations to global streams of information and knowledge (Rennen and Martens, 2003). Thinking of the global availability of information based on the international distribution of newspapers and increased access to the internet, social media and telephone connections as well as more travel opportunities, countries are more socially globalized if the population is able to use these media sources and have more personal contacts.

In principle, we would expect more global societies to know more about (global) environmental problems. As people have increasing access to education and information about negative side effects of consumption and production become well known, environmental awareness increases together with demand for 'cleaner' products (Motoshita et al., 2015). At the same time producers promote their 'clean' products, increasing public understanding even more (Najam et al., 2007). Thus, social integration can give rise to more informal regulation, by empowering civil society, consumers, but also businesses and governments to cooperate in new governance structures and create general pressure for pro-environmental behavior, adaption and regulation (Dinda, 2004). We assume a 'global environmental awareness' hypothesis suggesting that social globalization decreases ecological pressures.

In contrast, global mobility of people, including migration, may physically and mentally distance individuals from the negative environmental (and social) impacts of the global economy (Dinda, 2004). Physical distancing refers to simply moving away from environmental problems. Mental or cognitive distancing are the result of socio-economic

and cultural tele-connections, which inhibits the understanding of how social and ecological problems elsewhere are connected to one's own individual behavior (Steffen et al., 2005). As a result, more information about environmental problems does not by itself lead to greater environmental awareness and concern. Additionally, consuming ever more global media exposes people to advertisements and other media contents that disseminate materialistic and consumerist values (Najam et al., 2007; Rennan and Martens, 2003). Increased meat and dairy consumption, increased mobility and international tourism are all drivers of ecological pressures. Thus, one could also expect, a 'socio-cultural distancing' hypothesis where social globalization increases ecological pressures. A priori we have no expectations which effect dominates.

IV. 3 ESTIMATION STRATEGY

In the empirical strategy we first identify a robust set of controls before we disentangle the nexus between globalization and ecological pressures. The results are presented in the next section where we also address potential measurement issues and biases. Our analysis covers 146 countries worldwide for the 1980-2009 period in an unbalanced panel depending on the availability of data for the explanatory variables.

IV. 3.1 Extreme Bounds Analysis

Since the evidence on determinants of the Ecological Footprint so far is mixed, we follow the literature (e.g., Dreher et al., 2012; Yang et al., 2015) and use a variant of the Extreme Bounds Analysis (EBA) based on Leamer (1983), Levine and Renelt (1992), Sala-i-Martin (1997) and Sturm and De Haan (2005) to identify a robust vector of controls. The EBA is a statistical tool to test whether the variables suggested in previous work are indeed robustly related to Ecological Footprints independent of other explanatory variables included in the regression. We use the following general equation to conduct the EBA:

$$Y_{it} = \beta_M \mathbf{M}_{it-1} + \beta_F \mathbf{F}_{it-1} + \beta_Z \mathbf{Z}_{it-1} + \vartheta_t + \tau_i + v_{it} \quad (\text{IV. 1})$$

where $i = 1, \dots, N$ and $t = 1, \dots, T$. Y is the dependent variable; \mathbf{M} is a vector of commonly accepted explanatory variables; \mathbf{F} is a vector including the variables of interest; and \mathbf{Z} is a

vector of up to three additional variables (following Levine and Renelt, 1992); all variables are lagged by one year. ϑ_t is the time fixed-effect, τ_i are the country fixed-effects and v_{it} is the standard error term.

The EBA is applied in two steps. First, the robustness of the base model (M) is tested by including the variable of the F vector while the remaining variables of the Z vector are used in all possible combinations of up to three at a time. In a second step we test whether additional variables are systematically related. In order to decide whether a variable in F is robust we consider the whole distribution of the estimates as suggested by Sala-i-Martin (1997) and use the threshold value of 0.95 of the unweighted cumulative density function CDF(0) suggested by Sturm and De Haan (2005).¹⁴² A CDF(0) of 0.95 indicates that at least 95 percent of the distribution lies on one side of zero which is regarded as support for that coefficient to have a robust relationship.¹⁴³

Arguably, the choice of the variables of the baseline model in the M vector as well as selection into the Z vector is arbitrary. However, we base our selection for the M vector on the existing theory and empirical findings regarding the IPAT identity as described in Section IV. 2 and, accordingly use population, income and technology together as core determinants (base model). These are proxied, first, by the share of economically active population, which has been shown to consistently influence the EF of consumption (Dietz et al., 2007; York et al., 2003). Second, we use (ln) GDP per capita as a measure of the standard of living in a country and (ln) GDP per capita squared to account for a potential non-linear relationship as suggested by the Kuznets Curve relationship. Third, we include the ratio of energy use to GDP which is a measure of commercial energy intensity. All variables are from the World Development Indicators database (World Bank, 2014).

¹⁴² The original very strict criterion proposed by Leamer (1983) and Levine and Renelt (1992) of a test of a variable in F to be robust considers the lower bound of β_F (that is the lowest value minus two standard deviations) and the upper bound (highest value plus two standard deviations) of this coefficient to both be on one side of zero. However, Sala-i-Martin (1997) shows that this criterion is a very strong one and a researcher is bound to find a positive or negative coefficient if both directions are supported. He suggests considering a variable to be robust when the CDF is at least 0.9.

¹⁴³ For a detailed discussion on advantages and limitations of the EBA see Gassebner et al. (2010b).

For the F vector we consider 29 additional variables. First, our three globalization measures, and further variables suggested by the literature on Ecological Footprints and pollution.¹⁴⁴ These variables can be categorized in several dimensions: demographic determinants other than economically active population are population growth and density, (Gassebner et al., 2010b; Lamla, 2009) and the share of the population living in urban areas (Dreher et al., 2008; Jorgenson and Clark, 2011). The results for these variables have not been conclusive. Additional economic factors that have been tested by Lamla (2009) and Gassebner et al. (2010b) are GDP growth and manufacturing share of GDP. Jorgenson and Burns (2007) include the agriculture share of GDP to test the effect of the agricultural sector. We further include 'socio-economic conditions' to control for general macro-economic conditions of the country. Data are provided by the International Country Risk Guide (PRS Group, 2012). As additional geographic variables, we include per capita land area and arable land as a share of total land since they have an influence on the capacity of the countries to compensate pollution and absorb waste (Dietz et al., 2007; Jorgenson and Clark, 2011).

Environmental awareness is a key determinant of human environmental demands on the planet, because it influences consumption patterns in mobility and energy consumption (UNEP, 2012a). We test other energy use variables including fossil fuels energy consumption, electricity production from oil sources and the share of alternative and nuclear energy provided by the World Bank (2014). To capture the effect of mobility, we employ road sector energy consumption in total and in per capita terms and CO₂ as a global pollutant.

(Environmental) governance structures and processes have an impact on ecological human pressures through regulation, standards, management and political and legal institutions (Dinda, 2004; Gallagher, 2009b). The capacity and effectiveness of governance institutions are proxied by corruption, law and order, bureaucratic quality, government stability, democratic accountability and regime type (PRS Group, 2012). Another political

¹⁴⁴ All variables, their definition and sources are listed in appendix Table A IV. 3.

variable suggested by Lamla (2009) is the number of years the chief executive has been in office (Beck et al., 2001) following the notion that long-term rule reduces the willingness to control for environmental stressors.

Finally, Dreher et al. (2012) suggest that issues regarding the internal and external security of a population may play a crucial mediating role. Countries that face high levels of external or internal conflict may have weak institutions, low productivity and destroyed infrastructure additional to the hardship the population faces. This might reduce the respect for “eco-rights” and thus increase ecological pressure.¹⁴⁵ We therefore include variables for physical integrity rights, internal, and external conflicts. Similarly, Jorgenson et al. (2010) emphasize the role of military actions on ecological pressures which is captured by military expenditure as a share of GDP provided in the WDI data (World Bank, 2014).

Taking all factors into account we might face multicollinearity problems with variables that potentially overlap. This is most likely when variables are related to each other as is the case for example by using land area and arable land as a share of total land area. Therefore, we carefully investigated the correlations between our explanatory variables and take it into account when analyzing the results of the EBA in Section IV. 4.1.¹⁴⁶

IV. 3.2 Empirical specification

We conduct the EBA and test our hypotheses by estimating equations of the following form:

$$Y_{i,t} = \beta_1 Y_{i,t-1} + \beta_2 X_{i,t-1} + \beta_3 Glob_{i,t-1} + \lambda_t + \mu_i + \varepsilon_{i,t} \quad (IV.2)$$

where $Y_{i,t}$ is the natural log of the annual Ecological Footprint per capita measure described above and $Y_{i,t-1}$ is the lagged dependent variable which captures the persistence in the evolution of the EF. The $X_{i,t-1}$ is a vector of robust factors influencing human environmental demands identified by the EBA, and $Glob_{i,t-1}$ is overall globalization or all of the three sub-dimensions. We expect the covariates to affect ecological pressures with only a short time

¹⁴⁵ Dreher et al. (2012) look at the relationship between globalization and human rights; one could argue that high ecological footprints and increasing levels of pollution are a violation of eco-rights, which are comparable to human rights.

¹⁴⁶ The full pair-wise correlation table is provided in appendix IV, Table A IV. 4.

lag of one year, since the depletion of resources reduces the land-use type included in the calculation of the EF only with a short delay. The term λ_t describes the time fixed-effects and μ_i is the country fixed-effects.¹⁴⁷ By employing the within fixed-effects estimator with time fixed-effects we control for unobserved time invariant and time variant common shocks which capture cross-sectional dependence that is homogenous across countries. The idiosyncratic error terms is $\varepsilon_{i,t}$. Consequently, our estimates exploit variation within countries around a common trend. Then our parameter vector of interest (β_3) can be interpreted as the short-run effect of globalization on the Ecological Footprints.

The specification raises some econometric issues. Since the lagged dependent variable is included, first, long term effects are affected by the coefficient of the lagged dependent variable as well. Second, this coefficient also comprises the unobserved country effects which could lead to downward bias the state dependence in the fixed-effects specification (Nickel, 1981). This Nickel bias is decreasing in T and since our panel has an average length of 25 time years, it should be reasonably small.¹⁴⁸ Another potential bias may arise with auto- and spatial correlation in the error structure. Autocorrelation may inflate the z-statistic and cause invalid inference in a fixed-effects model (Bertrand et al., 2004). We apply Pesaran's (2004) method testing the null hypotheses of cross-sectional independence in the error terms which can be rejected at conventional levels. Therefore, we deal with these issues by adjusting the standard errors for heteroskedasticity, autocorrelation and cross-sectional correlation specific to each country, according to Driscoll and Kraay (1998).¹⁴⁹

¹⁴⁷ The Hausman-test rejects using the random effects estimator at the one percent level of significance.

¹⁴⁸ Dropping the lagged dependent variable from the models leads to generally similar results on our other explanatory variables, which also suggests that our main conclusions are not intensely affected by the Nickell bias. Additionally, Judson and Owen (1999) show that in panels with a T larger than 20 the bias is very small.

¹⁴⁹ We additionally estimate the regressions by using cluster robust standard errors in the fixed-effects setting, the feasible generalized least squares estimator with heteroskedasticity and autocorrelated standard errors and linear regression with panel-corrected standard errors as suggested by Beck and Katz (1995). The results do not change qualitatively and are available on request.

IV. 4 EMPIRICAL FINDINGS

We report the findings in three steps: first, we analyze the relevance (direction and magnitude) of the baseline and additional variables by discussing the EBA results. Second, we turn to our hypotheses. All robust variables of the extreme bounds analysis are included and then we evaluate the relationship between globalization and the Ecological Footprint. Finally, we investigate whether the results are different for components of the EF and address concerns one might have with the empirical strategy.

IV. 4.1 EBA results

Table IV. 1 reports the results of the extreme bounds analysis for the per capita Ecological Footprint.¹⁵⁰ As expected we find the lagged dependent variable to be a highly significant determinant of the Ecological Footprint in the following year. The same holds for the income level, energy intensity (technology) and the share of economically active population. All effects are positive and statistically significant at least at the 5 percent level indicating that the per capita EF of consumption is positively related to the standard of living, technology and population.¹⁵¹

The average effect of income on human pressures is positive, increasing, and almost always significant (100 percent for the level and 82 percent of the squared term). There is no indication in the data of an EKC relationship which suggests a decrease in ecological pressures as countries grow wealthier. Rather we even find that higher GDP per capita is non-linearly correlated and is related to a disproportional increase of human demands. Thus, the magnitude is economically relevant since an increase by 5 percent in GDP per

¹⁵⁰ We also performed the EBA, first, using the within fixed-effects estimator with cluster robust standard errors. This does not change the findings qualitatively. We only show the Driscoll and Kraay (1998) adjusted standard errors results. Second, we used multivariate normal multiple imputation to impute the control variables and get a constant sample before applying the EBA. The results are not shown, but show the same results for the base vector. For the larger vector of controls the results are not exactly the same. However, the average coefficients are very small even suggesting no factors, besides the IPAT variables, are of sizable importance. Results are available on request. Since we find only minor differences in the average number of observations (Table IV. 1) we expect no sample selection bias.

¹⁵¹ We also performed the analysis considering a higher level of significance, where the share of significant coefficients is based on the cut off at the one percent level. The results are the same, only the share of significant predictors reduces as expected.

capita is correlated with an increase in the Ecological Footprint of about 1.1 percent. Energy intensity also shows a positive and robust significant coefficient on average. An increase of energy consumption by 10 percent relates to rising ecological pressures on average by almost 1 percent. Finally, an increase in the economically active population increases the EF per capita consistently and is robustly statistically significant at least at the 5 percent level. A 5 percent increase in the Ecological Footprint per capita is equal to an increase in the share of the economically active population by 1 standard deviation (around 6 percent). On average the effects seem plausible and sizable.

Table IV. 1: EBA results Ecological Footprint per capita

Variables	Avg. β	Avg. ν	%Sign.	CDF(0)	lower bound	upper bound	Combi	Avg. Obs
<i>Base model</i>								
Y (t-1)	0.579	0.061	1.00	1.00	0.000	0.754	4089	2569
(ln) GDP pc	0.212	0.034	1.00	1.00	0.000	0.341	4089	2569
(ln) GDP pc square	0.011	0.005	0.82	0.98	-0.012	0.035	4089	2569
(ln) Energy/GDP	0.102	0.017	1.00	1.00	-0.017	0.198	4089	2569
Population (15-65 yrs)	0.008	0.001	1.00	1.00	0.000	0.013	4089	2569
<i>Extended model</i>								
Agriculture/GDP	-0.002	0.001	1.00	0.99	-0.004	0.000	3682	2408
Urban population	-0.002	0.001	0.87	0.97	-0.007	0.001	3682	2553
External conflict	0.003	0.001	0.85	0.97	-0.002	0.009	3682	2339
Bureaucratic quality	0.008	0.004	0.86	0.97	-0.006	0.020	3682	2339
Social globalization	-0.001	0.000	0.70	0.96	-0.003	0.001	3682	2542
Population growth	0.007	0.005	0.30	0.91	-0.012	0.025	3682	2550
(ln) Area pc	0.057	0.032	0.35	0.90	-0.095	0.442	3682	2553
Government stability	0.002	0.002	0.23	0.89	-0.004	0.007	3682	2339
Years in office	0.001	0.000	0.33	0.89	-0.001	0.002	3682	2545
Physical integrity rights	0.002	0.002	0.07	0.88	-0.004	0.009	3682	2469
GDP growth	0.001	0.000	0.32	0.88	-0.001	0.003	3682	2543
Corruption	0.004	0.004	0.07	0.84	-0.009	0.016	3682	2339
Road energy per capita	0.000	0.000	0.73	0.84	0.000	0.000	3682	2530
Road energy consump. Share	0.001	0.001	0.59	0.79	-0.003	0.004	3682	2530
Internal conflict	0.001	0.001	0.01	0.78	-0.005	0.006	3682	2339
Oil energy	0.000	0.000	0.18	0.76	-0.001	0.001	3682	2530
Alternative and nuclear energy	0.000	0.000	0.01	0.68	-0.003	0.002	3682	2530
Fuel energy consumption	0.000	0.000	0.10	0.64	-0.003	0.002	3682	2553
Economic globalization	0.000	0.000	0.17	0.64	-0.001	0.003	3682	2504
(ln) Arable land share	0.006	0.014	0.00	0.63	-0.057	0.073	3682	2529
(ln) Military exp./GDP	-0.003	0.009	0.00	0.63	-0.028	0.023	3682	2048
Socio economic conditions	0.000	0.002	0.00	0.62	-0.005	0.006	3682	2339
Regime type	0.002	0.004	0.05	0.60	-0.020	0.042	3682	2552
Manufacturing/GDP	0.000	0.001	0.06	0.60	-0.004	0.003	3682	2261
(ln) CO2 pc	-0.003	0.011	0.05	0.59	-0.056	0.060	3682	2549
(ln) Population density	0.017	0.038	0.09	0.57	-0.319	0.472	3682	2530
Political globalization	0.000	0.000	0.31	0.56	-0.001	0.002	3682	2542
Law and order	0.000	0.003	0.00	0.55	-0.009	0.011	3682	2339
Democratic account.	0.000	0.002	0.01	0.54	-0.007	0.008	3682	2339

Notes: Dependent variable: EF of consumption per capita. The variables in the extended model are ordered according to the size of the CDF. $Y(t-1)$ lagged dependent variable. Avg. β = average coefficient; Avg. ν = average Driscoll and Kraay adjusted standard error; %Sign. = percentage share coefficient is significant; CDF(0) = unweighted cumulative density function (threshold 0.95), lower (upper) Bound = lowest (highest) value of coefficient minus (plus) two standard deviation; Combi = # of variable combinations; Avg. Obs. = average # of observations. All variables are lagged by 1 year. Period: 1981-2009, 146 countries.

Using this baseline specification we find that additional variables are robust correlates of the Ecological Footprints per capita. The variables that are robust according to the threshold of Sturm and de Haan (2005) are the share of agriculture, the share of the urban population, external conflict, bureaucratic quality of the government and social globalization. Interestingly, social globalization is negatively correlated which supports the 'global environmental awareness' hypothesis. An increase in social globalization by 10 points on average, which is equivalent to the difference of the index in Argentina between 1991 and 1997 for example, is correlated with a decrease of 1 percent by the EF (driven by consumption and production as shown in the next section). This almost compensates for the pressure imposed by technology. Nevertheless, the finding suggests that internationally on average social connectedness increases the awareness of populations towards sustainable environmental use and may have the power to decrease human demands.

The EF of consumption is also systematically and negatively related to the share of agriculture in total GDP. A decrease in the share of agriculture by one standard deviation is associated with an average increase of 2.6 percent of the per capita EF. The share of urban population turns statistically significant in 87 percent of the regressions. It turns out to be negatively related to the EF per capita where an increase in the share by 10 percent is related to a decrease of human pressures by 2 percent. This is rather counter intuitive since we would expect that an increase in urbanization increases ecological demands. Although the results suggest that on average this trend goes hand in hand with an improvement of ecological pressures, the average coefficient is very small.

We also find that external conflict is negatively correlated to the EF. The coefficient is positive indicating that a decrease of two points (one standard deviation) on the twelve point scale, which is equivalent to an increase of external conflict risk, is correlated with a reduction of the per capita EF by 0.6 percent. This at first sight again seems to be counter intuitive. We would expect countries that are affected by external conflict and threats of foreign action care less about eco-rights. However, the opposite seems to be the case. The final robust indicator (according to our EBA results) is the bureaucratic quality index which on average is positively associated with the EF. In low risk countries, where the bureaucracy

is strong and revisions of policies are less likely, higher human demands on the environment are observed. This is in contrast to expectations where hypothetically a better bureaucratic quality should enhance the capacity and effectiveness of governance institutions to mitigate human demands. Presumably, investment choices are prioritized over ecological sustainability. One might also think that a strong bureaucracy slows down environmentally sustainable adjustments of the economy, since more feasibility concerns have to be overcome. Considering also that structural change is rather a long term process, we might not be able to capture positive effects here, since we look at short-term changes. After having identified a robust vector of controls, we use these findings to analyze the relationship between ecological pressures and multidimensional globalization in greater depth.

IV. 4.2 Main results

Turning to the hypothesis tests, the analysis of the relation between globalization and human environmental demands reveals some interesting findings. We report different specifications of Eq. (IV. 2). We always include the base vector of controls and the share of agriculture as control vector. In order to make sure that our results are not driven by sample selection we also use the imputed sample.¹⁵²

Table IV. 2 reports the main results. We find that overall globalization is not significantly related to the EF of consumption. Turning to the different dimensions of globalization separately, the coefficient of political globalization is positive but not statistically significant. We find social globalization to be significantly and negatively related to the EF of consumption. An increase by 10 units (out of 100), which is the difference between Switzerland and the US, for example, is correlated with a decrease of the EF of 0.9 percent. Economic globalization is positive and significant, with a 10 point increase corresponding to a 0.7 percent increase in the EF. These effects illustrate that the different

¹⁵² The multiple imputations on the control variables are performed using multivariate normal regressions with 20 imputations where the standard errors are adjusted according to Rubin's (1987) combination rule. The variables with bounded values are adjusted using truncated regressions in order to keep the scale using additional 20 imputations.

dimensions of globalization can have diverging effects, leading to insignificant results of the overall index. The effects vanish in the constant imputed sample

Table IV. 2: EF per capita and globalization

Variables	EF consumption				EF production			
	Globalization	0.0003 (0.001)		0.0001 (0.001)		0.0002 (0.000)		0.0000 (0.001)
Political		0.0004 (0.000)		0.0005 (0.000)		-0.0000 (0.000)		-0.0000 (0.000)
Social		-0.0009** (0.000)		-0.0005 (0.000)		-0.0006* (0.000)		-0.0001 (0.000)
Economic		0.0007** (0.000)		-0.0000 (0.000)		0.0008** (0.000)		0.0001 (0.000)
# of Observations	2963	2846	4118	4118	2963	2846	4118	4118
# of Countries	141	124	146	146	141	124	146	146
R-squared (within)	0.591	0.595	imputed		0.721	0.742	imputed	

Variables	EF imports				EF exports			
	Globalization	0.0061*** (0.002)		0.0057*** (0.001)		0.0052*** (0.002)		0.0064*** (0.002)
Political		0.0000 (0.000)		0.0003 (0.000)		-0.0008 (0.001)		-0.0009 (0.001)
Social		0.0035*** (0.001)		0.0038*** (0.001)		0.0041** (0.002)		0.0061*** (0.002)
Economic		0.0033*** (0.001)		0.0013*** (0.000)		0.0016* (0.001)		0.0012 (0.001)
# of Observations	2963	2846	4118	4118	2963	2846	4118	4118
# of Countries	141	124	146	146	141	124	146	146
R-squared (within)	0.699	0.705	imputed		0.558	0.584	imputed	

Notes: Significance levels: *** p<0.01, ** p<0.05, * p<0.1. Driscoll and Kraay adjusted standard errors in parentheses. All regressions include the lagged dependent variable, country and period fixed-effects and the control variables: (ln) GDP pc and its square, (ln) energy/GDP, population (15-65 years), agricultural share in GDP, urban population, external conflict and bureaucratic quality measures. All explanatory variables are lagged by 1 year.

Since the EF is constructed from different perspectives we investigate whether globalization is differently related to the other variants of the Ecological Footprint. Thus we analyze the EF of production, imports and exports separately (Table IV. 2). We find that multidimensional globalization is not related to the EF of production, but that it is significantly and positively related to the EF of imports and exports which also holds for the imputed sample. This suggests that the multidimensional process of globalization is systematically associated with the ecological pressures of trade. Countries that are more globalized exhibit higher EF of exports and imports. The size of the effects for the EF of

imports and exports translates into an increase of around 6.1 and 5.2 percent when globalization increases by 10 units, respectively. The effects are slightly different in the imputed sample. Thus, *ceteris paribus*, countries which are more globalized have higher ecological footprints of imports and exports.

Turning to the perspectives of the EF, we do not find any systematic relationship between political globalization and one of the subcomponents of the EF in any of the specifications. Interestingly we find that social globalization is divergent for different perspectives of the EF. For instance, for the EF of production the relation is negative. The effect is statistically significant at the 10 percent level and indicates that increasing social globalization by 1 standard deviation (around 20 points) is related to a decrease in the EF of production by around 1.2 percent. This provides evidence for the 'global environmental awareness' hypothesis where increased international connectedness seems to lead to a higher vigilance in national production. Again the effect vanishes if we use the imputed sample, while the sign is still negative. In contrast, in the case of EF of imports, we find a positive and significant correlation to social globalization. The magnitude of the effect translates into an increase of imported pressures by 7 percent if social globalization increases by one standard deviation. One possible explanation is that societies that are more open to other cultures have a higher demand for international products which translate into ecological pressures. The effect is independent of the sample size. The relation to ecological pressures of exports shows similar results. The coefficient is positive, and significant regardless of the sample. Regarding the last component of globalization, we find economic globalization to positively and significantly relate to the EF of production, imports and exports. The effects remain significant in the imputed sample only for the EF of imports. Presumably, economically more open countries exhibit higher environmental pressures of the traded products.¹⁵³

¹⁵³ We also ran regressions on the constant sample for all different specifications using only the base variables and also controlling for the larger vector of robust controls. The findings are qualitatively similar to the ones in Table IV. 2. The main difference is that the systematic relationship of social and economic globalization to the per capita EF of production vanishes. The results for the ecological pressures of imports and exports are robust to different controls and sample size. The results are available from the authors upon request.

Overall, the main findings indicate that globalization has no unambiguous effect on Ecological Footprints. In terms of our hypotheses, we find no support for the 'global environmental governance' hypothesis. If at all the effect seems rather devastating positively relating to ecological pressures. Especially, in terms of the EF of exports and imports we robustly find that more globalized countries exhibit higher ecological pressures which both seems to be due to economic and social globalization.¹⁵⁴ For social globalization we find mixed evidence. On the one hand, the coefficient is negative (but not consistently significant) for the EF of consumption and production, lending support to the 'global environmental awareness' hypothesis. On the other hand, we find positive coefficients for the EFs of production, imports and exports confirming our hypothesis of 'socio-cultural distancing'. For economic globalization we find support of our 'intensification' hypothesis for EFs of production, imports and exports. These findings suggest that socially globalized societies increase their environmental awareness towards local consumption and production, but are rather ignorant when it comes to imported or exported goods.

In order to analyze whether GDP per capita is one channel through which globalization relates to the EF, we perform the analysis excluding both variables (GDP per capita and its square). The findings are robust to this application (results not shown). We do find evidence that the correlation of globalization and human pressures of consumption and production are driven by the wealth level. The coefficients of globalization increase and we find more to be statistically significant. However, the estimates suffer from an upward bias due to omitted variables. Given that we control for the main channels we are more restrictive, reduce omitted variable bias and are able to identify the pure effect of globalization that goes beyond income.

IV. 4.3 Sensitivity analysis

We perform several additional tests to look into the relationship between ecological pressures and globalization and challenge our main results. First, one may argue that the

¹⁵⁴ If we analyse whether there is a different relationship in developing and industrialized countries, we do find some indication that more developed countries drive our results.

main channel through which globalization affects ecological pressures is through GDP per capita. Therefore, we perform the analysis excluding both variables (GDP per capita and its square) in order to test whether the relation with globalization is altered. The findings are robust to this application (not shown). We do find some evidence that the correlation of globalization and human pressures of consumption and production are driven by the wealth level. The coefficients are larger in size and we find more to be statistically significant. However, the estimates suffer from an upward bias due to omitted variables.¹⁵⁵ Given that we control for the main channels we are more restrictive, reduce omitted variable bias and are able to identify the pure effect of globalization that goes beyond income.¹⁵⁶

Second, we observe that most ecological demand measured by the EF is due to land-use needed to absorb carbon dioxide. Therefore, we disaggregate the Ecological Footprint in non-carbon and in carbon land-use types and explore whether the relationship with globalization differs between the two types. Table IV. 3 shows the results including the full vector of control variables. We find that there is no difference for the Ecological footprint of consumption and production. The only sign of a systematic relation is observed in the non-carbon EF of production and economic globalization where we find a positive and significant coefficient at the 1 percent level.

The major differences are observed in considering the EF of imports, where we find indications for an increase in non-carbon and carbon pressures when overall globalization increases. For non-carbon elements this seems to be driven by social and economic globalization, whereas in the case of carbon EF this seems to be related to political and economic integration. One could argue that an increase in the carbon Ecological Footprint is related to an increase in political globalization, indicating that global governance fails in preventing carbon emission limitations in imports. We find some evidence that the non-carbon footprint of imports is positively associated with social globalization while the carbon stressors are not systematically affected. Also, more economically open countries

¹⁵⁵ The results are available upon request from the authors.

¹⁵⁶ We also exclude China and the USA from the set of countries, given that both are main CO₂ polluters and China also observes a different growth pattern than many industrialized countries. The results are not changed by this test.

induce more pressures on both carbon and non-carbon EF of imports suggesting a devastating relation for both aspects.

Table IV. 3: EF per capita and globalization (non-carbon and carbon)

	EF consumption				EF production			
	non-carbon	carbon	non-carbon	carbon	non-carbon	carbon	non-carbon	carbon
Globalization	0.000 (0.001)	-0.004 (0.004)			0.000 (0.001)	-0.001 (0.001)		
Political			0.000 (0.000)	0.001 (0.001)			-0.000 (0.000)	-0.000 (0.001)
Social			-0.001 (0.000)	-0.003 (0.002)			-0.001 (0.001)	-0.000 (0.001)
Economic			0.001 (0.000)	-0.002 (0.002)			0.002*** (0.001)	-0.001 (0.001)
# of Observations	2272	2272	2258	2258	2272	2272	2258	2258
# of Countries	113	113	111	111	113	113	111	111
R-squared (within)	0.365	0.216	0.367	0.217	0.656	0.665	0.661	0.665
	EF imports				EF exports			
	non-carbon	carbon	non-carbon	carbon	non-carbon	carbon	non-carbon	carbon
Globalization	0.003* (0.001)	0.006*** (0.002)			0.002 (0.001)	0.005** (0.002)		
Political			-0.000 (0.001)	0.002*** (0.001)			-0.000 (0.001)	0.001* (0.001)
Social			0.002* (0.001)	0.002 (0.001)			0.001 (0.001)	0.002 (0.002)
Economic			0.002** (0.001)	0.002*** (0.001)			0.002** (0.001)	0.002* (0.001)
# of Observations	2272	2272	2258	2258	2272	2272	2258	2258
# of Countries	113	113	111	111	113	113	111	111
R-squared (within)	0.712	0.773	0.714	0.774	0.661	0.702	0.670	0.702

Notes: Significance levels: *** p<0.01, ** p<0.05, * p<0.1. Driscoll and Kraay adjusted standard errors in parentheses. All regressions include the lagged dependent variable, country and period fixed-effects and the base variables: (ln) GDP pc and its square, (ln) energy/GDP, population (15-65 years), agricultural share in GDP, urban population, external conflict and bureaucratic quality measures. All explanatory variables are lagged by one year. Non-carbon and carbon refers to the land-use types in the calculation of the EF.

In terms of the EF of exports we find that carbon elements are positively associated with overall globalization at the 10 percent level of significance. In this separate consideration we find no indication for a significant relation to social globalization, but a positive correlation of the carbon EF of exports and political globalization as well as economic integration. The effects are significant at the 10 percent level. Thus, considering carbon and non-carbon stressors on the environment included in the calculation of the EF reveals that they are

differently related to globalization. There are some indications that the carbon element is systematically related to globalization, however, no clear pattern emerges.

Endogeneity concerns

Finally, looking into the relation between human environmental pressures and globalization we may face an endogeneity bias if, first, the correlation is rather from ecological pressures inducing globalization, or if, second, an underlying dynamic factor has an impact on both phenomena. We now turn to address these issues step by step.

On the one hand, an important issue regarding the relationship between the Ecological Footprint and globalization is the potential reverse causality in Eq. (IV.2). It could be that an increase in the EF causes global integration rather than being its outcome. Arguably, greater local human demand on the environment might also lead to higher levels of globalization. For instance, greater human environmental pressure of a country may increase the country's willingness to participate in international agreements or organizations to help reduce these pressures. We do three things to show that our estimates are not biased: first, we (already) lagged all explanatory variables, given that an increase of human pressures on the environment caused by further integration will be visible in the next year. Second, we follow Dreher et al. (2012) and perform Granger-causality tests. This test states that, according to Granger (1969) variable x causes variable y , if past values of x help explain y , once controlled for past influence of y in the following way:

$$y_{it} = \sum_{j=1}^m \alpha_j y_{it-j} + \sum_{j=1}^m \beta_j x_{it-j} + \delta_i + \xi_t + \omega_{it} \quad (\text{IV.3})$$

where $i = 1, \dots, N$ and $t = 1, \dots, T$. We estimate a fixed-effects panel estimator where α_j and β_j are the parameters, m is the maximum lag length, δ_i is the country fixed-effect, ξ_t is the time fixed-effect and ω_{it} is the idiosyncratic error term clustered on the country level. The stationary assumption of the series is tested by employing a Maddala and Wu (1999) test for unbalanced panel data. The null hypothesis of all series being non-stationary can be rejected at the one percent level. We report the results of the Granger-causality test in Table IV. 4

where the F-statistic on β_j together with the respective p-value is displayed testing the null hypothesis that x Granger-causes y.

Table IV. 4: Granger causality (1981-2009, 146 countries)

	y = EF, x = Glob		y = Glob, x=EF	
	EF consumption			
Overall	2.91	(0.057)	1.69	(0.188)
Political	2.84	(0.062)	2.03	(0.136)
Social	2.02	(0.136)	0.67	(0.514)
Economic	2.80	(0.065)	0.19	(0.831)
	EF production			
Overall	6.37	(0.002)	2.81	(0.063)
Political	3.45	(0.035)	3.13	(0.047)
Social	1.40	(0.249)	1.18	(0.312)
Economic	6.29	(0.003)	1.15	(0.319)
	EF imports			
Overall	7.49	(0.001)	2.86	(0.061)
Political	3.89	(0.023)	1.45	(0.237)
Social	5.22	(0.006)	3.44	(0.035)
Economic	9.50	(0.000)	1.20	(0.303)
	EF exports			
Overall	8.62	(0.000)	1.30	(0.275)
Political	1.63	(0.199)	1.00	(0.369)
Social	5.43	(0.005)	3.73	(0.026)
Economic	3.71	(0.027)	0.70	(0.497)
	F-statistic	p-value	F-statistic	p-value

Notes: Table IV. 4 reports F-statistics (joint significance) and the respective p-values in parentheses using two lags.

The first pair of results shows the values testing the null hypothesis that globalization does not Granger-cause EF. We fail to reject the null hypothesis in the case of social globalization on the EF of consumption and production and in the case of political globalization on the EF of exports. The second pair of results (column 2) tests for the null hypothesis that the Ecological Footprint does not Granger-cause globalization. We can reject the null hypothesis for EF of consumption and confirm that globalization Granger-causes the Ecological Footprint. In the case of social globalization the direction of the effect seems to be unclear and has to be interpreted with care. This is also the case for overall and political globalization and the three other perspectives of the EF. The exercise shows that we can interpret the effect of economic globalization as Granger-causing the EF and its components

as we never fail to reject the null but we have to be careful in the consideration of political and social globalization where Granger causality seems to be unclear.

Third, we do a crude test where we exchange the globalization measures and the Ecological Footprint in Eq. (IV. 2) as dependent and independent variables. We report the results in Table IV. 5. The lagged EF as well as all components never turns statistically significant at conventional levels when regressed on the globalization indicators. Overall, the results suggest that we cannot rule out reverse causality. Overall, we provide evidence that causality runs from globalization to human ecological pressures. For social globalization a careful consideration of the underlying mechanism needs to be taken into account.

The second source of potential endogeneity could be an omitted variable bias where an omitted factor influences ecological pressures and globalization simultaneously. To address this Wooldridge (2010) suggests the use of an instrumental variable approach. We apply difference and system Generalized Method of Moments (GMM) estimators with internal instruments to estimate Eq. (IV.2). The difference GMM estimator uses the second and higher lag levels of the endogenous regressors in a difference equation (Holtz-Eakin et al., 1988; Arellano and Bond, 1991). Arellano and Bover (1995) and Blundell and Bond (1998) suggest the system GMM estimator which avoids problems of weak instrumentation by instrumenting levels with lagged differences and estimate the equation both in differences and in levels simultaneously. The system GMM estimator leads to consistent and more efficient estimates than difference GMM if the lagged differences are not correlated with the unobserved effects. We use two-step system GMM with a small sample correction suggested by Windmeijer (2005).

Table IV. 5: Reverse relationship

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Overall globalization			Political globalization			Social globalization			Economic globalization						
(ln) EF of consumption	0.043 (0.230)				0.131 (0.555)				-0.133 (0.330)				0.198 (0.300)			
(ln) EF of production		-0.231 (0.344)				-0.668 (0.546)				-0.111 (0.368)				-0.292 (0.590)		
(ln) EF of imports			0.072 (0.084)				-0.041 (0.251)				0.027 (0.071)				0.187 (0.221)	
(ln) EF of exports				-0.081 (0.080)				-0.290 (0.180)				0.075 (0.100)				-0.124 (0.120)
# of observations	3200	3200	3200	3200	3200	3200	3200	3200	3200	3200	3200	3200	3071	3071	3071	3071
# of Countries	146	146	146	146	146	146	146	146	146	146	146	146	129	129	129	129
R-squared (within)	0.963	0.963	0.963	0.963	0.869	0.869	0.869	0.869	0.948	0.948	0.948	0.948	0.928	0.928	0.928	0.928

Notes: Dependent variables are the globalization indicators; Significance levels: *** p<0.01, ** p<0.05, * p<0.1. All regressions include the lagged dependent variable and the base controls: (ln) GDP per capita, energy use and population share (15-65 years), as well as time and country fixed-effects. Driscoll and Kraay (1998) adjusted standard errors are in parentheses.

Although in general this seems a promising approach caution is still in order. The additional assumption made by system GMM is that the initial conditions $(y_{i,1})$ represent a stationary process of the underlying data generating process. This requires that there is no correlation between variations from the long term mean and the stationary country-specific long term mean of the dependent EF variable (Blundell and Bond, 1998). In the case of the Ecological Footprint this seems to be a very strong assumption, since there is no reason to believe that the speed of change in human demands is unrelated to its current level. Furthermore, Roodman (2009) shows that both differenced and system GMM estimates are often unstable and strongly depend on the instrument matrix used. Bun and Windmeijer (2010) also demonstrate that the level equation in system GMM similarly to the difference equation in difference GMM suffers from a weak instruments problem biasing the results. A possible solution to reduce the bias would be convincing exogenous variation in globalization that does not affect ecological demand which we think is very difficult to find.¹⁵⁷ Given the caveats of the GMM estimator and the difficulty to find conclusive instrumental variables we are careful in interpreting the GMM results as our main findings.

¹⁵⁷ We are not aware of any approach which develops a convincing instrument for globalization and does not affect ecological pressure other than through globalization. For instance, using average neighbouring values (i.e., political allies, geographical distance countries) of sub-components of the KOF index (see, e.g., Vadlamannati, 2015) has arguably the same disadvantages as the overall index.

Table IV. 6: System GMM dynamic estimates

Panel A:

	EF consumption		EF production		EF imports		EF exports	
Globalization	-0.0004 (0.003)		-0.0032 (0.003)		0.0093*** (0.004)		-0.0045 (0.006)	
Political		0.0011 (0.001)		-0.0009 (0.001)		0.0027* (0.001)		-0.0038* (0.002)
Social		0.0014 (0.003)		-0.0006 (0.002)		0.0014 (0.004)		0.0014 (0.004)
Economic		-0.0005 (0.002)		0.0001 (0.001)		0.0008 (0.003)		0.0006 (0.003)
# of Observations	2272	2258	2272	2258	2272	2258	2272	2258
# of Countries	113	111	113	111	113	111	113	111
Instruments	92	152	92	152	92	152	92	152
AR1 (pvalue)	0.000	0.000	0.000	0.000	0.000	0.000	0.061	0.060
AR2 (pvalue)	0.759	0.467	0.018	0.010	0.568	0.596	0.548	0.544
Hansen's J (pvalue)	0.183	0.998	0.092	0.997	0.416	0.999	0.183	1.000

Panel B:

	EF consumption		EF production		EF imports		EF exports	
Globalization	-0.0053** (0.002)		-0.0113 (0.013)		0.0079 (0.005)		0.0042 (0.004)	
Political		-0.0012 (0.001)		-0.0008 (0.001)		0.0025 (0.002)		-0.0001 (0.002)
Social		-0.0023 (0.002)		-0.0039* (0.002)		-0.0004 (0.004)		0.0047 (0.007)
Economic		-0.0028* (0.001)		-0.0008 (0.001)		0.0029 (0.004)		0.0013 (0.003)
# of Observations	2272	2258	2272	2258	2272	2258	2272	2258
# of Countries	113	111	113	111	113	111	113	111
Instruments	40	48	40	48	40	48	40	48
AR1 (pvalue)	0.000	0.000	0.203	0.000	0.008	0.000	0.044	0.047
AR2 (pvalue)	0.522	0.386	0.449	0.013	0.592	0.603	0.502	0.493
Hansen's J (pvalue)	0.356	0.214	0.439	0.333	0.241	0.090	0.427	0.220

Notes: Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All regressions include the lagged dependent variable and the control variables: (ln) GDP pc and its square, (ln) energy/GDP, population (15-65 years), agricultural share in GDP, urban population, external conflict and bureaucratic quality measure. The values reported for AR(1) and AR(2) are the p-values for first and second order autocorrelated disturbances in the first differences equations. Hansen's *J*-test reports the p-values for the null hypothesis of instrument validity.

In Table IV. 6 the results are presented. We find that the results are different depending on the specification of the instrument matrix. In Panel A we do not restrict the number of instruments. In Panel B we use the third and fourth lag as instruments to test the sensitivity to a different lag structure, where the lag length is an arbitrary choice. We do not find any statistically significant relationship between the EF of consumption and production neither for the overall globalization measure nor for the sub components in panel A. However, we do find a positive and statistically significant coefficient at the 1 percent level for globalization and the per capita EF of imports. The effect is three times larger compared to our main specification (Table IV. 2) indicating that an increase of 10

on the globalization scale is correlated with an increase in the EF of imports by 0.9 percent. Looking at the different dimensions of globalization, the political measure turns out to be statistically significant at the 10 percent level.

In panel B we find indications for a negative relationship of globalization and the EF of consumption. The coefficient is statistically significant at the 5 percent level and much larger than in our main specification in Table IV. 2. Surprisingly, we also find a negative relationship between economic globalization and the EF of consumption. For the EF of production we find some support for the negative influence of social globalization. In this setting we do not find statistically significant relations to the EF of imports and exports. Overall, the estimates are larger compared to our preferred fixed-effects setting which would suggest that we estimate a lower bound for the relation between the EF and globalization there whereas the true 'causal' effect might be larger.

Judging on the validity of the approach in our sample we cannot reject the null hypothesis of Hansen's J-test of the validity of the over identifying restriction in most specifications except for column 3 Panel A and column 6 Panel B (Table IV. 6). However, in panel A the p-values are suspiciously high being one or close to one suggesting that the number of instruments is too large relative to the group size, although we collapse the instrument matrix as suggested by Roodman (2009). Already a reasonable period of observation leads to a rapid increase in the number of instruments and makes it difficult to find an instrument set which compensates the gain in efficiency with the loss of relevance (Newey and Windmeijer, 2009). In Panel B, thus, we restricted the number of instruments which shows that the results are fragile, depending on the lag structure. The p-values of first and second order autocorrelated disturbances in the first-differenced equation show high first order autocorrelation throughout both panels. For the EF of production we do also find evidence for significant second order autocorrelation suggesting instrument endogeneity for this outcome variable. Taking the caveats of GMM into account and looking at the inconsistent results, we refrain from putting too much weight on them and base our main findings on the fixed-effects specification presented in Table IV. 2. We are quite confident that our main results present lower bound estimates of the relationship between ecological demand and the process of globalization, even though we are not able to identify a true causal effect.

To summarize, globalization relates differently to the per capita EF of consumption, production, imports and exports. The relation with overall globalization seems to be mixed and not informative in the case of per capita ecological pressure of consumption and production. But we find consistent positive evidence for the relationship between the EF of imports and exports regardless of the sample. We also find some evidence of differences between non-carbon and carbon elements of human demands. The carbon component of the EFs is positively correlated with political integration, suggesting that the global governance is not able to limit carbon emissions. Interestingly, we find evidence for a global environmental awareness hypothesis in human pressures of consumption and production whereas we find evidence for our social-cultural distancing hypothesis in human pressures of imports and exports. Presumably, societies value national production and consumption more and are more restrictive, but are less strict towards imported and exported products. These findings suggest that the process of multidimensional globalization is related to ecological demand beyond the influence of income, population size and technology, but is much more diverse than suggested by simple correlations. The Granger causality tests suggest that ecological pressure may also cause social globalization. Thinking of the immense migration flows in the last few years, this could be one explanation. Social mobility is then a result of increased environmental degradation and human induced pressures.

IV. 5 CONCLUSION

Summing up, this chapter provides a systematic empirical analysis of the drivers of ecological pressures and examines if and how globalization as a multidimensional process is related to these human-induced environmental stressors. In contrast to the existing literature, we apply comprehensive measures of both phenomena using the Ecological Footprint and a multidimensional globalization index. We identify basic drivers and extract a robust set of relevant factors before we test our hypotheses. We then employ a panel data setting with fixed country and year effects accounting for cross-section interdependence in the standard errors. We address endogeneity issues in various ways. First, we exploit the time structure of the data set and show that globalization Granger-causes ecological pressures rather than the other way round for

most dimensions. Secondly, we use the dynamic panel data estimator of two-step system GMM, which points in the same direction.

Our main finding is that globalization is related to ecological pressures in a diverse manner. We try to capture these diversities by looking not only at the EF of consumption, but also the EF of production, the EF of imports and the EF of exports separately and disaggregate globalization into economic, social and political aspects. Social globalization is identified as robust factor relating to ecological pressures of consumption and production negatively and to imports and exports positively. On the one hand, this support the hypothesis that increased social connectedness may help to reduce environmental stressors and foster sustainable development especially in national consumption and production. Regarding ecological pressures induced by imports and exports, this effect disappears and we find social globalization to even enhance human demand. The more socially globalized a country is the less care is given to environmental stressors embedded in imports and exports. Societies in more socially globalized (developing) countries seem to care less about sustainability concerns in traded goods, presumably because they are increasingly confronted by materialistic and consumerist values. However, since we cannot rule out reverse causality completely, social globalization may also be caused by ecological pressures.

The findings for overall globalization are mixed depending on the sample. For economic and political globalization we find some support of an enhancing influence, but not robust to different tests. Interestingly, political globalization seems to be of less importance in shaping human demands on the environment. This is surprising since international intention is to reduce environmental stressors and pressure on the ecosystem. However, our findings suggest that international efforts do not influence these pressures in the short run. Since we only investigate the short term relationship, there might still be a long-term influence which we do not capture here. As suggested by the IPAT notion the main drivers of ecological pressures are the income level of countries, the share of the economically active population and technology. Furthermore, a larger vector of important controls is identified by our Extreme Bounds Analysis and includes the agricultural share in GDP, external tension, urban population share, and institutional quality.

Thus, in contrast to the simplifying statement of Borghesi and Vercelli (2003) we do diverse relationships of globalization and environmental human demands. The analysis reveals that a careful consideration of the perspective of examination is important when claiming that globalization increases environmental human demands.

There are no clear policy implications of this study. Our evidence suggests that human pressures are, or rather have been induced by the focus on standard of living, disregarding the consequences on the earth system and exhausting recourses. Thereby, the single most effective leverage point to unambiguously reduce human demands seems to be income per capita. Nevertheless, we find that increasing awareness has the potential to reduce ecological pressures and shape human environmental demand.

APPENDIX IV

Table A IV. 1: KOF Index of Globalization (2014)

Indices and Variables	Weights
A. Economic Globalization	[36%]
i) Actual Flows	(50%)
Trade (percent of GDP)	(21%)
Foreign Direct Investment, stocks (percent of GDP)	(27%)
Portfolio Investment (percent of GDP)	(24%)
Income Payments to Foreign Nationals (percent of GDP)	(27%)
ii) Restrictions	(50%)
Hidden Import Barriers	(24%)
Mean Tariff Rate	(28%)
Taxes on International Trade (percent of current revenue)	(26%)
Capital Account Restrictions	(22%)
B. Social Globalization	[38%]
i) Data on Personal Contact	(33%)
Telephone Traffic	(25%)
Transfers (percent of GDP)	(4%)
International Tourism	(26%)
Foreign Population (percent of total population)	(21%)
International letters (per capita)	(24%)
ii) Data on Information Flows	(35%)
Internet Users (per 1000 people)	(36%)
Television (per 1000 people)	(37%)
Trade in Newspapers (percent of GDP)	(27%)
iii) Data on Cultural Proximity	(32%)
Number of McDonald's Restaurants (per capita)	(45%)
Number of IKEA (per capita)	(45%)
Trade in books (percent of GDP)	(10%)
C. Political Globalization	[26%]
Embassies in Country	(25%)
Membership in International Organizations	(28%)
Participation in U.N. Security Council Missions	(22%)
International Treaties	(25%)

Source: Dreher (2006), updated version 2014.

Table A IV. 2: Variables and Sources

Variable	Description	Source	Mean	Std. Dev.	Min	Max
(ln) EF pc of consumption	Natural logarithm of the Ecological Footprint (EF) per capita of final consumption	Global Footprint Network (2014)	0.88	0.69	-0.72	2.83
Overall globalization	Globalization multidimensional index: 1 (not globalized), 100 (completely globalized)	Dreher (2006), Dreher et al. (2008); version 2014	53.47	17.89	15.04	92.50
Economic Globalization	Economic globalization including restrictions and flows (1 low; 100 high)	Dreher (2006), Dreher et al. (2008); version 2014	54.02	19.14	9.94	99.16
Social Globalization	Social globalization including cultural proximity, personal contacts and information flows (1 low; 100 high)	Dreher (2006), Dreher et al. (2008); version 2014	44.93	22.62	4.64	93.68
Political Globalization	Political globalization (1 low; 100 high)	Dreher (2006), Dreher et al. (2008); version 2014	63.07	20.99	6.47	98.26
(ln) GDP per capita	Natural logarithm of GDP (constant 2005 US\$) per capita	World Bank (2014)	8.15	1.57	4.72	11.38
(ln) GDP per capita squ.	Squared natural logarithm of GDP (constant 2005 US\$) per capita	World Bank (2014)	2.53	2.58	0.00	12.02
Energy/GDP	Energy use (kg of oil equivalent) per \$1,000 GDP (constant 2005 PPP)	World Bank (2014)	5.29	0.60	1.94	7.36
Population (15 -65 years)	Share of population between 15 and 65 of the total population	World Bank (2014)	60.98	6.63	45.29	84.68
(ln) Arable land share	Natural logarithm of arable land (% of land area)	World Bank (2014)	-1.77	1.23	-9.00	1.12
Agriculture/GDP	Agriculture, value added (percent of total GDP)	World Bank (2014)	14.51	12.78	0.04	68.88
Oil energy	Electricity production from oil sources (percent of total)	World Bank (2014)	21.44	28.32	0.00	100.00
Altern. and nuclear energy	Alternative and nuclear energy (percent of total energy use)	World Bank (2014)	8.64	13.30	0.00	119.48
(ln) Area pc	Natural logarithm of total area available	Global Footprint Network (2014)	7.55	1.25	3.17	11.19
Fuel energy consumption	Fossil fuel energy consumption (percent of total)	World Bank (2014)	65.77	31.10	0.00	103.55
Road energy	Road sector energy consumption (kt of oil equivalent)	World Bank (2014)	15.04	8.14	0.56	56.03
Road energy per capita	Road sector energy consumption per capita (kg of oil equivalent)	World Bank (2014)	341.05	445.18	1.85	4880.06
(ln) CO2 per capita	Natural logarithm of CO2 emissions (metric tons per capita)	World Bank (2014)	0.83	1.52	-5.59	4.15
GDP growth	GDP growth (annual, percent)	World Bank (2014)	3.59	5.65	-42.45	88.96
(ln) Military exp./GDP	Natural logarithm of military expenditure as share of GDP	World Bank (2014)	0.69	0.71	-3.36	3.68
Manufacturing/GDP	Manufacturing industry value added (percent of GDP)	World Bank (2014)	16.49	7.19	0.00	43.54
(ln) Population density	Natural logarithm of population density (people per square kilometer of land area)	World Bank (2014)	4.05	1.37	0.21	8.84
Urban population	Urban population (percent of total population)	World Bank (2014)	56.78	22.03	6.09	100.00
Population growth	Growth rate of the general population	World Bank (2014)	1.62	1.51	-5.92	17.48
Years in office	Chief executive years in office.	Beck et al. (2001)	7.10	7.72	1.00	46.00
Regime type	Six-fold regime classification: 0. Parliamentary democracy; 1. Mixed (semi-presidential) democracy; 2. Presidential democracy; 3. Civilian dictatorship; 4. Military dictatorship; 5. Royal dictatorship.	Cheibub et al. (2010)	2.11	1.58	0.00	5.00
Physical integrity rights	The composite index of physical integrity rights is the additive of torture, extrajudicial killings, political imprisonments, and disappearance, ranging from 0-8	Cingranelli and Richards (2011)	4.92	2.30	0.00	8.00
Bureaucracy quality	Bureaucracy quality: 4(very low risk), 0 (very high risk)	ICRG (2012)	2.29	1.17	0.00	4.00
Corruption	Corruption within the political system: 6(very low risk), 0 (very high risk)	ICRG (2012)	3.17	1.37	0.00	6.00
Democratic accountab.	Democratic accountability: 6(very low risk), 0 (very high risk)	ICRG (2012)	3.94	1.61	0.00	6.00
External conflict	External conflict: 12(very low risk), 4(very high risk); 3 components	ICRG (2012)	9.88	2.05	0.00	12.00
Internal conflict	Internal conflict: 12(very low risk), 4(very high risk); 3 components	ICRG (2012)	9.04	2.52	0.00	12.00
Government stability	Government Stability: 12(very low risk), 4(very high risk); 3 components	ICRG (2012)	7.86	2.13	1.00	12.00
Socio econ. conditions	Socioeconomic conditions: 12(very low risk), 4(very high risk); 3 components	ICRG (2012)	5.90	2.23	0.00	11.00
Law and order	Law and order: 6(very low risk), 0 (very high risk)	ICRG (2012)	3.85	1.48	0.00	6.00

Table A IV. 3: List of countries

Countries under Study			
Albania	Cyprus	Korea, Rep.	Sao Tome and Principe
Algeria	Czech Republic	Kuwait	Saudi Arabia
Angola	Denmark	Kyrgyz Republic	Senegal
Antigua and Barbuda	Dominican Republic	Latvia	Singapore
Argentina	Ecuador	Lebanon	Slovak Republic
Armenia	Egypt, Arab Rep.	Lesotho	Slovenia
Australia	El Salvador	Libya	South Africa
Austria	Equatorial Guinea	Lithuania	Spain
Azerbaijan	Eritrea	Luxembourg	Sri Lanka
Bahamas, The	Estonia	Macedonia, FYR	St. Lucia
Bahrain	Ethiopia	Malaysia	St. Vincent and the Grenadines
Bangladesh	Fiji	Maldives	Sudan
Barbados	Finland	Malta	Sweden
Belarus	France	Mauritius	Switzerland
Belgium	Gambia, The	Mexico	Syrian Arab Republic
Belize	Germany	Moldova	Tajikistan
Benin	Ghana	Mongolia	Tanzania
Bhutan	Greece	Morocco	Thailand
Bolivia	Grenada	Mozambique	Togo
Bosnia and Herzegovina	Guatemala	Namibia	Tonga
Botswana	Guinea-Bissau	Nepal	Trinidad and Tobago
Brazil	Guyana	Netherlands	Tunisia
Brunei Darussalam	Haiti	New Zealand	Turkey
Bulgaria	Honduras	Nicaragua	Turkmenistan
Cabo Verde	Hungary	Nigeria	Ukraine
Cambodia	India	Norway	United Arab Emirates
Cameroon	Indonesia	Pakistan	United Kingdom
Canada	Iran, Islamic Rep.	Panama	United States
Chile	Iraq	Paraguay	Uruguay
China	Ireland	Peru	Uzbekistan
Colombia	Israel	Philippines	Venezuela, RB
Comoros	Italy	Poland	Vietnam
Congo, Dem. Rep.	Jamaica	Portugal	Yemen, Rep.
Congo, Rep.	Japan	Qatar	Zambia
Costa Rica	Jordan	Romania	
Cote d'Ivoire	Kazakhstan	Russian Federation	
Croatia	Kenya	Samoa	

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