

Working Paper: Do Human Rights Treaties Change Economic Outcomes?

Christopher Gahagan

Florida State University

Department of Political Science

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Abstract

What are the economic effects of political treaties? International treaties like CEDAW have significant effects on women's political and health outcomes. However, we know little about CEDAW's effect on the informal economy. I argue that CEDAW ratification reduces informal economic activity by reducing barriers for women in the formal sector. Using non-parametric matching and difference-in-differences, I show ratification reduced informality by as much as 2.2% of GDP in certain regions. This work contributes to research in both international organizations and informal economies in two ways. First, this is the earliest work that explicitly links a human rights treaty to the size of a country's informal economy. Thus, shedding light on the effects of international human rights treaties on economic outcomes and generating new insights and avenues for future research. Second, by addressing model dependence and relaxing implausible unconfoundedness assumptions, I draw stronger causal inference than previous research has allowed.

Introduction

One of the most important questions for human rights scholars regards the effectiveness of human rights treaties. The debate regarding treaty effectiveness has been ongoing for decades with scholars arguing both in favor (Brandt et al. 2019; Englehart and Miller 2014; Fariss 2014; Hill 2010; Simmons 2000; 2006) and against improved human rights records (Cingranelli and Filippov 2018; Hafner-Burton and Tsutsui 2005; 2007). Nearly everyone recognizes the endogeneity that occurs when countries self-select into treaties, with some scholars arguing countries only do so if they a priori intend to follow the treaty's rules (Downs et al. 1996). However, there's also counterintuitive evidence that in the case of human rights treaties, many of the most repressive countries formally commit to treaties while never having the intention to carry out their obligations (Hathaway 2002; Vreeland 2008). Evidence such as this rightly calls into question whether human rights treaties are effective at all, or if countries are simply signing onto human rights treaties as a form of window dressing, while ignoring their legal obligations. However, even in the face of these challenges, arguments and evidence exist for positive outcomes brought on by the international human rights regime. Hafner-Burton and Tsutsui (2005) note that international pressure contributed to the decline in forced disappearances in Argentina, reduction of legal barriers for Koreans in Japan, as well as altering the way the Israeli government interrogates suspected terrorists. In short, when it comes to the effectiveness of human rights treaties on real world outcomes, the evidence is mixed.

One of the most popular human rights treaties in the world is the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW), which as of 2021, counted 187 U.N. member countries as having ratified the treaty and has the stated goal of the elimination of discrimination against, and the promotion of equal rights, for all women. Such a large number of ratifying countries naturally brings forth the question of whether countries are following their treaty obligations or simply ratifying CEDAW to enhance their image to the international community. If countries are following through on

their obligations, then CEDAW ratification should lead to increases in multiple aspects of women's lives. Previous research looking at this question often incorporate measures expressly devoted to women's rights such as those found in the Cingranelli and Richards (CIRI) human rights database (Cingranelli and Richards 2010; Hill 2010), as well as broader health outcomes such as female life expectancy, female adult mortality rates, maternal mortality ratios, and neonatal mortality rates (Gevrek & Middleton 2015; Smith-Cannoy et al. 2020; Tait et al. 2019). However, an important area that researchers have not been able to discern are the effects of ratification on general economic outcomes. This gap poses an opportunity for researchers, economists, and international organizations to understand how seemingly political treaties can affect economic outcomes, especially given that women make up roughly half of the world's population, yet are often underrepresented in the formal economy (World Bank 2022) and notably, overrepresented in the informal economy (Delechat and Medina 2021).

Importantly, the size of the worldwide informal economy is surprisingly large, with current estimates at around two billion people, roughly 61% of the world's global workforce (Delechat and Medina 2021), and has been shown to account for over 75% of a country's GDP (Schneider and Enste 2000). Informal economies differ from illicit economies such as drug smuggling, human trafficking, or arms sales, wherein the act itself is outright illegal. Rather, informality is often considered as otherwise legal activities that are deliberately concealed to avoid payment of income, taxes, or meeting legal standards such as minimum wage, maximum hours, or safety regulations. Large informal economies tend to be associated with a reduction in state revenues, which results in a decrease in the quality and quantity of public goods, institutions, and services (Schneider 2005), in addition to high levels of poverty and inequality, especially among women (Delechat and Medina 2021). In contrast, lowering levels of informal economic activity can lead to increased access for state revenues and thus more public goods provisions due to a larger tax base, as well as an increase in normatively desirable outcomes such as less dangerous work, better pay, lower rates of poverty and inequality, as well as better personal, political, and economic empowerment (Bonnet et al. 2019; Delechat and Medina 2021; Malta et al. 2021).

Given both the stated goals of CEDAW and the overrepresentation of women in the informal economy, I argue that if countries are following through with their treaty obligations, ratification should result in a significant reduction in the size of the informal economy compared to non-ratifying countries. Additionally, I argue the main mechanism by which CEDAW ratification works through involves the reduction of legal barriers to the workforce that have historically prevented women from attaining formal employment. To test my argument, I incorporate a new methodological approach for matching time-series cross-sectional (TSCS) data within a difference-in-differences design put forth by Imai, Kim, and Wang (2021) to capture the economic effects of CEDAW ratification. Particularly, I test whether countries who ratified CEDAW see a measurable difference in the size of their informal economy up to three years after ratification compared to matched control groups. In the results section, I show that after matching countries on treatment, outcome, and covariate histories, CEDAW ratification has a robust and statistically significant reduction on informal economic activity, decreasing the size of the informal economy by as much as 2.2% of Gross Domestic Product (GDP) in certain regions, resulting in millions of dollars in additional taxable revenue. In an additional analysis, I show that CEDAW ratification results in a positive and significant increase regarding women's legal capacity to get a job, thus giving evidence towards the proposed mechanism of a reduction in formal barriers for women entering the workforce.

This study speaks to multiple literatures including those regarding international law, international institutions, human rights, and informal economies. The main contributions are two-fold. First, this is the earliest work that I am aware of that explicitly links a human rights treaty to the size of a country's informal economy. Thus, I shed light on the effects of international human rights treaties on economic outcomes as well as generate new insights and exciting avenues for future research. Second, by using techniques to address model dependence and relaxing implausible unconfoundedness assumptions in TSCS data, I am able to draw stronger causal inference regarding CEDAW's effectiveness than previous research has allowed.

This paper proceeds as follows. In the next section I offer a short review of previous work regarding the adoption of international treaties nested in the screening versus constraining debate. In the

following section I describe in more detail the size, scope, and effects of informal economic activity well as why high levels of informality acts as an obstacle towards women's growth and development. In the research design section, I describe the approach taken to causally identify CEDAW's effect on informal economic activity utilizing a time series cross sectional matching and difference-in-differences design. The main results section shows ratification significantly lowers work in the informal sector and is supported by a series of robustness tests. I conclude the study with avenues for future research and a discussion on why researchers should look beyond traditionally studied outcomes when investigating the effectiveness of human rights treaties.

Human Rights and Treaty Ratification

The development of a global human rights regime over the past several decades has produced normative expectations for states to commit themselves to human rights protections (Hafner-Burton et al. 2008), whether or not they have the intention or capacity to follow through on their obligations. Downs et al. (1996) argued that states comply with treaties simply because these treaties mirror state preferences, and that the rules established reflect governments' own interests, therefore making treaty ratification an entirely endogenous act resulting in little to no change in state behavior. Under this logic, treaties "screen out" non-compliers ahead of time, and thus those who ratify would have acted in a similar manner had the treaty never existed at all.

However, if screening effects were the only reason states joined international treaties, then as Vreeland (2008) notes, we would expect to observe high or perfect compliance. Studies¹ have shown governments often ratify human rights treaties as a form of window dressing, which results in the perception that human rights treaties are often ineffectual. For example, when looking at the United Nation's Convention Against Torture (CAT), Hathaway (2002) finds that compared to non-ratifying states, those who ratified CAT were more likely to commit torture. Expanding upon this finding,

¹ Hafner-Burton (2005) and Hafner-Burton and Tsutsui (2005) argue that states frequently increase their human rights abuses as soon as external pressures decrease.

Vreeland (2008) states that the more a dictatorship practices torture, the more likely it is to ratify CAT. Although screening effects can occur in some international treaties, because of normative expectations surrounding the international human rights regimes, there's a strong possibility that states ratify these treaties with no intention of changing their behavior, rather to appease the international community. This scenario is especially high concerning CEDAW, where out of 194 U.N. member countries, 187 have ratified the treaty (Verveer and de Silva de Alwis 2021). Fortunately, previous scholars have made progress showing CEDAW's positive effects on women's political rights (Hill 2010) and health outcomes (Gevrek & Middleton 2015; Smith-Cannoy et al. 2020; Tait et al. 2019) offering evidence for ratification's improvement on women's lives. In addition to increases in political and health outcomes, I argue below that CEDAW ratification also results in possibly overlooked economic outcomes, specifically by enabling women to move out of the informal economy, and into formal work. In addition to the increase in a country's tax base and less precariousness, previous research has shown that moving women into the formal labor force generates positive normative outcomes such as boosting influence at the individual level resulting in more sway within the family (Beegle, Frankenberg, and Thomas 2001; Iverson and Rosenbluth 2006), at the societal level resulting in more egalitarian beliefs about gender relations (Thornton et al. 1983), and at the economic level by creating dense networks that boost their economic importance, therefore compelling governments to take their interests into account (Ross 2008). In the next section I give a brief introduction into informal economies, followed by my theory why, where, and how CEDAW ratification should reduce informal economic activity.

The Informal Economy

The informal economy, also known as the shadow economy, occurs to some degree within every country in the world. High levels of informal economic activity often have detrimental effects throughout society. In addition to the decrease in public goods and services as well as high levels of poverty and inequality mentioned above, large informal economies can lead to leading to distorted macroeconomic. Informal firms tend to be both small and have low levels of productivity, frequently promote the

inefficient use of scarce resources, and encourage the adoption of low-return technology and small scale productions, (Elbahnasawy et al. 2016), with the result being that countries with high levels of informality tend to grow well below their true potential (Georgieva 2021).

Researchers studying informal economies often point to two channels in which people or firms become informal, that of “exit” or “exclusion” (Perry et al. 2007; Tokman 2007). In the “exit” channel, firms and workers opt to leave the formal economy, or stay in the informal economy, due to high formal market entry costs, lack of formal market competition, tax burdens, institutional quality, and product or labor market regulation (Perry 2007; Schneider and Enste 2000; Williams and Schneider 2013).

Conversely, in the “exclusion” channel workers often desire employment in the formal sector, which comes with safer labor protections, higher wages, and less economic vulnerability, however they are excluded due to reduced labor protections, a lack of property rights (Devine 2021), or government policies such as legal barriers preventing women from obtaining formal work. In the next section I address how CEDAW helps to solve one aspect of the exclusion channel by compelling governments who have ratified the treaty to eliminate legal barriers against women’s formal employment.

CEDAW AND THE INFORMAL ECONOMY

Building upon the determinants within the exclusion channel for informal work, I argue that CEDAW ratification plays a meaningful role in reducing size of the informal economy. When countries enact laws that discriminate against a woman’s employment, they are in effect excluding them from the formal economy and forcing them to work informally to make a living. CEDAW addresses this policy failure to respect a women’s economic and labor rights thus enabling movement out of the informal economy and into formal employment.

Although CEDAW’s effect on the informal economy more than likely works through many different causal channels, I argue one important causal mechanism is the reduction of legal barriers to formal employment. Articles 11 and 13 of CEDAW expressly prohibit discrimination against women in

the fields of employment, ensuring women a right to work, equal employment opportunities, free choice of profession, equal benefits, and safe working conditions (U.N. General Assembly 1979). Ratifying countries are thus obliged to eliminate official barriers towards women's formal employment, a policy change that should result in decreased informality as women, who previously were excluded from seeking formal employment in the same manner as men, move into the the formal economy. If this is in fact occurring, in addition to CEDAW ratification lowering the size of the informal economy, we should see an increase in the rate that women are allowed to obtain formal employment on an equal basis with men shortly after CEDAW ratification occurs. Given these arguments, I propose the following two hypotheses:

H1: Countries who ratify CEDAW will see a decrease in informal economic activity relative to countries that do not (or have not yet) ratified.

H2: CEDAW ratification will lead to an increase in the rate of women allowed to seek formal employment on an equal basis as men.

Hypothesis one intends to test the effect of CEDAW ratification on a global scale, however there are plausible reasons that ratification might have heterogeneous effects on the size of the informal economy in different regions of the world. As mentioned previously, informality occurs for a variety of reasons, with CEDAW helping to solve a problem in the "exclusion" channel. Given this, CEDAW ratification should lower informality when women are excluded from formal employment due to discriminatory practices, however formal rules may not be the main constraint on women in the workforce in all regions. For example, Ross (2008) argues that oil rich countries often suffer from what he refers to as a modern form of Dutch Disease², wherein the sudden increase in wealth brought on by oil or other minerals causes a rise in the real exchange rate. Importantly, this wealth transforms the economy,

² For a detailed description of how mineral wealth and Dutch Disease changes an economy, see Ross (2008).

resulting in movement away from traded sectors that traditionally employ women (such as agriculture and export-oriented manufacturing) and towards nontraded sectors that traditionally employ men such as construction and services. If Dutch Disease is occurring, then we should not expect CEDAW ratification to have much influence in mineral rich countries because of the change in economic orientation brought about by mineral wealth. In short, while CEDAW addresses legal obstacles towards women in the formal economy, there may be economic reasons such as changes in economic orientation that explain why women are crowded out of the workplace. This leads to hypothesis 3 regarding the limited effect of CEDAW ratification on informal economic activity for mineral rich regions.

H3: CEDAW ratification will have a minimal effect, if any, on the size of the informal economy in mineral rich countries.

Additionally, for CEDAW ratification to change the size of a country's informal economy via the proposed mechanism of lowering formal barriers towards women in the workplace, then ratification should have a dampened effect on countries that hadn't held these barriers previously, or at least to smaller degree. In other words, countries that didn't restrict women's formal employment prior to CEDAW ratification should see a much smaller effect on the size of the informal economy, given that the "exclusion" channel for informality as defined above, had already been remedied. In particular, many advanced economies such as those found in the OECD, previously held many of the norms towards women put forth by CEDAW, thus ratification shouldn't result in major changes towards women in the formal economy, and thus a diminished effect on the size of the informal economy. This leads to hypothesis 4 regarding CEDAW's effect on the informal economy for OECD countries.

H4: CEDAW ratification will have the largest effect on the size of the informal economy in non-OECD countries.

Additionally, I argue we should see the strongest effect of CEDAW ratification in regions that are the opposite of those regions in hypotheses 3 and 4. Specifically, countries and regions that (i) previously had patriarchal barriers against women, and (ii) do not suffer from a modern form of Dutch Disease brought on by mineral wealth. Many countries in Asia often satisfy both of these conditions given previous patriarchal rules towards women in addition to their diverse economies including many export-led industries in products such as textiles, garments, plastics, electronic goods, shoes, and dishware (Ross 2008). Thus, we should expect the strongest regional effect of CEDAW ratification on informality to occur in Asian countries as women leave the informal economy for work in the formal sector. Therefore, hypothesis 5 argues the following:

H5: CEDAW ratification will have the strongest effect in Asia compared to other regions of the world.

As a point of clarification, while I do expect Asia to see the largest effects on the informal economy due to CEDAW ratification, this does not mean we shouldn't expect effects throughout other parts of the world. Given the unique combination of a patriarchal history, in addition to the fast growing and diverse economies in Asia, we should expect ratification to have the strongest in that region compared to other regions of the world. However, many countries in sub-Saharan Africa and Latin America have had a history of patriarchal views towards women, thus if CEDAW is changing behavior in these regions, we should also expect a reduction on the size of the informal economy. This leads to my final hypothesis regarding CEDAW's effect on the informal economy.

H6: CEDAW ratification will have a significant and negative effect on the size of the informal economy in sub-Saharan Africa and Latin America, albeit smaller than in regions with diverse economies such as Asia.

Research Design and Identification Strategy

To test my theory regarding CEDAW's effect on the size of the informal economy, I conducted a Time Series Cross Sectional (TSCS) matching and difference-in-differences analyses on levels of informal economic activity for a sample of 146 countries from 1978-2012, with the unit of observation being a country-year. The temporal range of the analyses is restricted to the years above because of limitations on informal economy data as well as the fact that by 2012 many countries in the world had already ratified CEDAW, albeit with a few notable exceptions³. To account for possible selection effects that could threaten the credibility of treatment assignment, I collected numerous potentially confounding pretreatment covariates that could affect treatment and outcome variables. By doing this, the ignorability of treatment assignment maintains credibility once the observed differences between confounders and the treated and control groups are adjusted (Imai et al., 2010).

The outcome variable in the analysis is the level of a country's informal economy (**Informality**) as a percent to GDP developed by Elgin and Oztunali (2012)⁴ and gathered from Blanton et al. (2018). Unlike regional survey data used to estimate levels of informal economic activity⁵, cross country informality data often uses complex statistical models to determine the size of a country's informal economy. In particular, the Elgin and Oztunali data is generated using a deterministic general equilibrium model in which representative households choose between two productive technologies, formal and informal. By matching various macroeconomic proxies, Elgin and Oztunali solve the model for the size of the informal economy in a given country-year⁶. The estimated size of a country's informal economy varies greatly in the data from a low of 7.96% for Switzerland in 2012, to a massive 81.69% of GDP for Georgia in 1994.

³ E.g., the United States signed CEDAW in 1980 but has yet to ratify.

⁴ The DGE model used by Elgin and Oztunali (2012), along with the MIMIC model (Schneider, 2000) are the two most employed models by various international organizations such as the World Bank and the IMF when studying informal economies.

⁵ See Cano-Urbina (2016).

⁶ See Elgin and Oztunali (2012) for a detailed description of the model.

Controls

Countries who ratify CEDAW often have vast differences in their respect for women's rights prior to ratification. To make sure like-countries are being matched, I incorporated a number of women's rights variables to be matched and balanced on. Although the Cingranelli and Richards (CIRI) Human Rights database has often been used when studying human rights (Hill 2010; Hill and Watson 2019; Richards and Gelleny 2007; Vreeland 2008), because of the econometric method utilized here, I opted in favor of VDEM's Gender Exclusion index, which covers the entire temporal span under study⁷. Gender Exclusion is measured on an interval scale ranging from 0 to 1 and is defined as when individuals are denied access to public services or participation based on gender in governed spaces (Coppedge et al. 2020). Specifically, the variable is formed via multiple gender indicators such as power distribution, equality in respect for civil liberties, access to public services, access to state jobs, and access to state business opportunities (Coppedge et al. 2020). I recoded the variable so that higher values represent more inclusion rather than exclusion. In other words, a country that has a score of 0.982 (e.g., Denmark in 2012) has much more gender inclusion than a country with a score of 0.026 (e.g., Saudi Arabia in 1990). To make the intended variable meaning more accurately reflect the coding scheme, the term **Gender Inclusion** will be used throughout the rest of the analysis.

Many of the concepts measured in the CIRI database have similar measures found within the World Bank's Women, Business, and the Law (WBL) report⁸ that also spans the entire temporal range of this study. Thus, for the main analysis I incorporated two indicators from the WBL report that are

⁷ The CIRI database starts in 1981, which given the matching techniques explained in the next section, does not give enough time for treated units to be matched on their respective pre-treatment covariates, treatment history, and the outcome variable of interest needed to satisfy the parallel trends assumption without significantly losing observations. Particularly, the method here requires a lag length in the data pre-treatment, with a length of three years chosen in the main analysis and lag length of 5 years for a robustness check. Given that CEDAW ratification started in 1981, utilizing the CIRI data for the main analysis would result in early ratifiers being left out of the sample and thus limiting possible matches.

⁸ Specifically, these variables are aggregated into the World Bank's Gender Statistics databank.

conceptually similar to many of CIRI's indicators regarding women's economic and empowerment rights. Specifically, I collected indicators measuring legal restrictions on property ownership for men and women (**Equal Prop. Ownership**), and if discrimination by creditors based on gender is legally allowed (**Credit Access**)⁹. To test the proposed mechanism of lowered formal barriers towards women in the workplace, I incorporated an indicator measuring whether there are restrictions on a woman's legal capacity to get a job (**Women Equal Work**) from the WBL report. This variable takes on a value of 1 if there are no legal restrictions towards women in the workforce, and takes a value of 0 if any of the following exist: "a husband can prevent his wife from working, permission or additional documentation is required for a woman to work but not a man, it is considered a form of disobedience with legal consequences, such as loss of maintenance, for a woman to work contrary to her husband's wishes or the interests of the family." (World Bank 2022).

Additionally, one of the main confounding variables in both the study of informality and human rights is often that of regime type, with previous researchers finding significant effects pertaining to both economic studies and human rights studies (Hill and Watson 2019; Richards and Gelleny 2007; Teobaldelli and Schneider 2013; Vreeland 2008). Many democratic norms purport to have at a minimum rough equality among citizens and therefore more egalitarian and inclusive policies. Thus, matching on regime-type characteristics enables me to have more accurate comparisons on both the treatment and the outcome variables needed to causally identify CEDAW's effects on economic informality. To address this, countries were matched and balanced on the Polity 2 index (**Polity**) from the Polity V database originally developed by Marshall and Gurr (2022). This index ranges from -10 to +10; with the most autocratic countries scoring -10 and the most democratic countries receiving a score of +10. Additionally, the level of economic development within countries such as Gross Domestic Product per capita (GDP per capita), unemployment rates, trade, foreign direct investment (FDI), the size of a country's population,

⁹ A complete list of all variables within the study can be found in the appendix with source information, short descriptions, and summary statistics.

and inflation have all been shown to influence respect for human rights, levels of informality, or treaty compliance (Delechat and Medina 2021; Dell’Anno 2010; Hill 2010; Richards and Gelleny 2007). To account for these possible confounding elements, countries were matched on a slew of economic indicators gathered from the World Bank’s WDI database including the log of **GDP per capita** (current 2015 \$US) the log of a country’s **Trade** (% to GDP), **Inflation** (annual %), **Unemployment** (% total labor force, ILO estimate), the log of a country’s total **Population**, as well as a country’s **FDI** (net inflows, % to GDP). Furthermore, previous research has found that violent conflict affects both human rights and informal economies (Blanton et al. 2018; Elbahnasawy et al. 2016; Hafner-Burton and Tsutsui 2007; Hill 2010) as conflict can lead to more repression by governments and more economic instability. To make sure countries are matched and weighted on this potential confounder, I followed Blanton et al. (2018) and incorporated their conflict intensity indicator (**Conflict Intensity**) originating from the UCDP/PRIO Armed Conflict Dataset (Gleditsch et al. 2002). This variable ranges from 0 to 2, with a score of 0 if a country does not experience any major internal conflict in a given year, 1 for conflicts in which the yearly death count ranges from 25 to 1000, and 2 for wars in which the annual total battle-related death count is above 1000 (Blanton et al. 2018).

To estimate the effect of CEDAW ratification on economic informality, I incorporated Hill and Watson’s (2019) coding of CEDAW ratification as a treatment variable, such that a country takes a value of 1 the year it ratifies the treaty (and every year thereafter) and 0 otherwise. Although technically allowed in the analysis, to my knowledge there was no treatment reversal that occurred wherein a country became treated (i.e., ratified CEDAW) and then reversed back into the control group. Substantively, I expect the results of treaty ratification shouldn’t happen immediately for reasons mentioned above. Given this, I opt for a post-treatment window of three years to observe the average treatment effect on the treated, i.e., the ATT. In particular, the analysis looks at the effect of ratification on changes in the size of a country’s informal economy compared to similarly matched countries who had not ratified the treaty at the time of treatment onset. The choice to estimate the average treatment effect on the treated was determined both because of substantive interest and by the data generating process. Given that this is a

quasi-experiment where units self-select and experience the treatment, we do not have the ability to force treated and control countries into two separate groups as in randomized control trials. More importantly, there is a substantive interest in the effects of treatment for countries that actually experience the treatment, which in this case is policy changes resulting from CEDAW ratification.

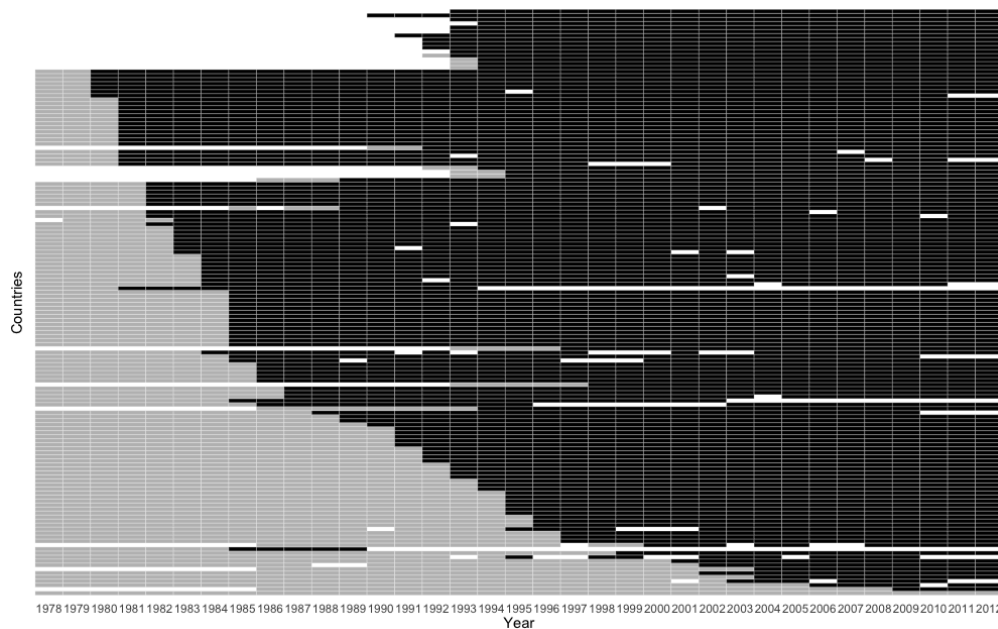
Lastly, previous scholars (Hill 2010) have rightly pointed out that simply estimating outcomes in countries who ratify international treaties compared to countries who never ratify can lead to biased results given that there are often domestic level characteristics that influence a state's decision to ratify. Fortunately, Imai, Kim, and Wang (2021) have proposed a new matching method for TSCS data, which is the method utilized in this paper, that sidesteps a lot of the econometric problems inherent in previous models used to estimate the effects of treaty ratification while also improving the validity of causal inference by reducing model dependence. To estimate the ATT, I utilized the R package `PanelMatch`, incorporating Covariate Balancing Propensity Score Weighting (CBPS) and a three-year lag to match each treated unit with weighted control units on the above mentioned covariates¹⁰. The goal of matching is to create matched sets between treated and control units to make them as similar as possible (i.e., balanced) prior to treatment onset. This technique gives stronger causal inference regarding differences in outcomes since we can argue that the method essentially creates “parallel units”, apart from one receiving treatment and the other unit staying in the control group.

As with most TSCS data, missingness of data is often an issue. Instead of using listwise deletion wherein missing observations would be dropped from the data, patterns of missingness in treatment and covariate history were analyzed within the `PanelMatch` package to better match control and treated units. This method allows for either treated or control units to have missing data in the specified lag window and matches those cases accordingly before assigning weights via whichever refinement method the user chooses. As an example, if information regarding unemployment rates for Haiti and the Dominican Republic are both missing in year T-3, this is analyzed in the `PanelMatch`

¹⁰ CBPS weighting offered better balance compared to Mahalanobis Distance Matching, however MDM was utilized for robustness checks.

package under the assumption that what is driving the missing data among these two countries is probably going to be similar and therefore they are more likely to make a strong match. To illustrate treatment history in the data, Figure 1 below shows the treatment and control status of all units in the analysis, where control units appear in grey, treated units appear in black, and white indicates a period when either a country did not exist or there is missing treatment data in the sample.

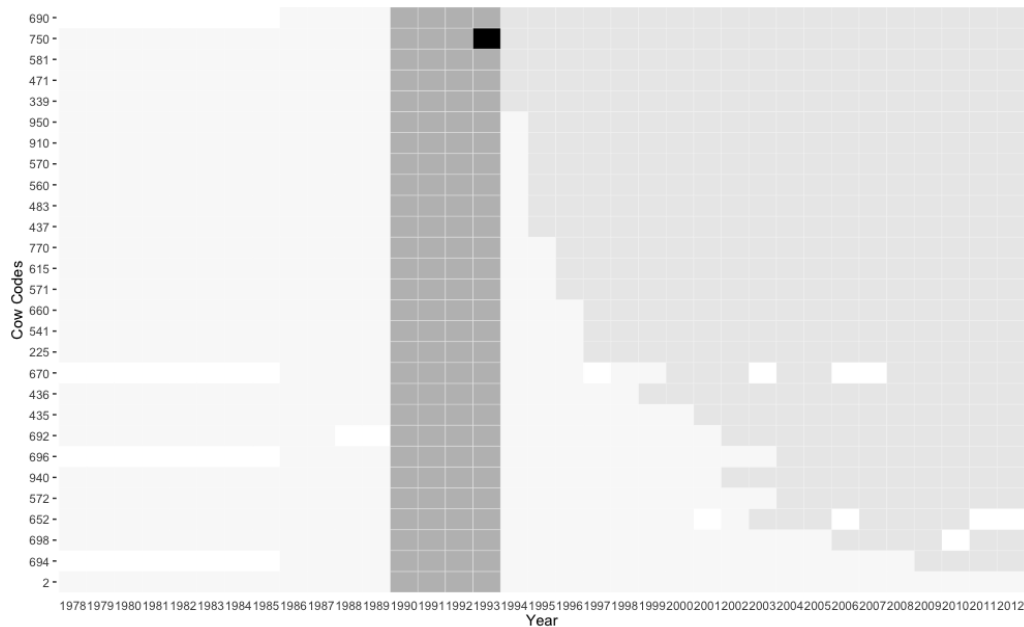
Figure 1. Ratification of CEDAW Across Countries and Time



Matching countries on the aforementioned covariates created a distribution of matched sets¹¹ within the data, resulting in 122 successful matches with an average matched set size of 46 controls per treated unit. Weights are given to the set of matched control units based on the CBPS weighting algorithm. As an example of treatment distribution, Figure 2 below shows the treatment distribution and matches (denoted by their Correlates of War codes) for India in 1993, the year in which India ratified CEDAW.

Figure 2. Treatment Distribution for India in 1993 with 3 lags

¹¹ See Appendix for a plot showing the distribution of matched sets.



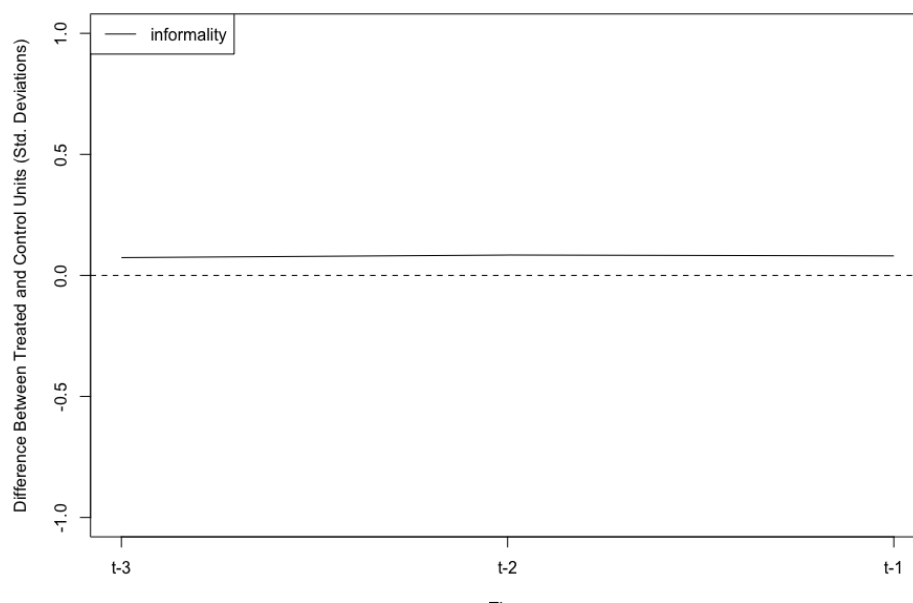
Once matching and weighting was completed, I performed a difference-in-differences analysis to determine the ATT of treaty ratification. A difference-in-differences approach facilitates causal inference when randomization is not possible. In cases where units within groups are observed in multiple time periods, the dependent variable is estimated when the average change in the control group is subtracted from the average change in the treatment group (Woolridge 2007). This process removes biases between treatment and control groups resulting from both differences between the groups as well as over time biases resulting from different trends.

An important aspect for causal identification in a difference-in-differences analysis is forgoing the sequential ignorability assumption in favor of the parallel-trends assumption. In many practical applications of TSCS data, the chance for unobserved confounders is high, making it harder to satisfy the unconfoundedness assumption and threatening causal inference under the sequential ignorability assumption. On the other hand, causal inference under the parallel trends assumption states that after conditioning on treatment, outcome, and covariate histories, if the outcome trends are parallel on average between treated and control units, then any change after treatment onset can plausibly be attributed to the

treatment itself. In other words, conditional on covariates, in the absence of treatment, outcomes among the treated units would have been the same, on average, as outcomes among the control units.

Although there is no way to observe the counterfactual needed to fully test the parallel trends assumption in TSCS data, using the refined matched sets created earlier allows us to visually examine whether time trends appear to be parallel between treatment and control groups. Figure 3 below shows the parallel trends plot on the size of the informal economy for both control and treated groups. Specifically, the x-axis shows the time (in years) before treatment onset, while the y-axis shows the average difference between treated units and the weighted average of control units across all matched sets and expressed in standard deviations (Imai et al. 2021). Large differences in standard deviations would infer that treated and control units are not parallel prior to treatment onset (i.e., if the line showing the difference in Figure 3 was around 1 or 2 standard deviations). However, the difference between treated and control units in the analysis is small, with values staying around 0.08 standard deviations¹². Given this visual inspection, it appears the parallel trends assumption holds.¹³

Figure 3. Parallel Trends: Difference Between Treated and Control Units



¹² For reference, the average level of informality in the data is 34.27% of GDP with a standard deviation of 13.34%.

¹³ A table showing the exact values of covariate balance before and after refinement can be found in the appendix.

An important point should be addressed regarding diff-in-diff analyses with staggered treatment timing. As Goodman-Bacon (2021) notes, because diff-in-diff analyses utilize both group sizes and treatment variances to weight estimates that rely on common trends for each group, the identifying assumption thus becomes a variance-weighted version of trends between all groups. In short, this equals out to a variance weighted average treatment effect on the treated (VWATT), with the identification assumption coming from the variance-weighted common trends (VWCT), resulting in a weighted average of all possible two-group and two-period diff-in-diff estimators in the data (Goodman-Bacon 2021). Although issues in staggered treatment can occur with weighting, this is taken into consideration with the flexible weighting estimator and matching on covariates proposed by Imai et al. (2021) and utilized here¹⁴.

Results

Below I present the estimated ATT of ratifying CEDAW on informal economic activity in the sample¹⁵. Figure 4 below shows ratification of CEDAW results in a robust and statistically significant decline in the size of a country's informal economy for the global sample, giving support to hypothesis 1. The effect becomes significant immediately and continues to have a negative and significant effect throughout the remaining temporal range. It is important to remember that these estimates are the difference between treated units minus their matched control units, giving us a reasonable counterfactual comparison of CEDAW's effect on economic informality. By the end of the treatment window, estimates show CEDAW ratification accounted for a decrease in the size of the informal economy by just under 1% of GDP¹⁶, which results in millions of dollars in additional taxable revenue that can be spent improving

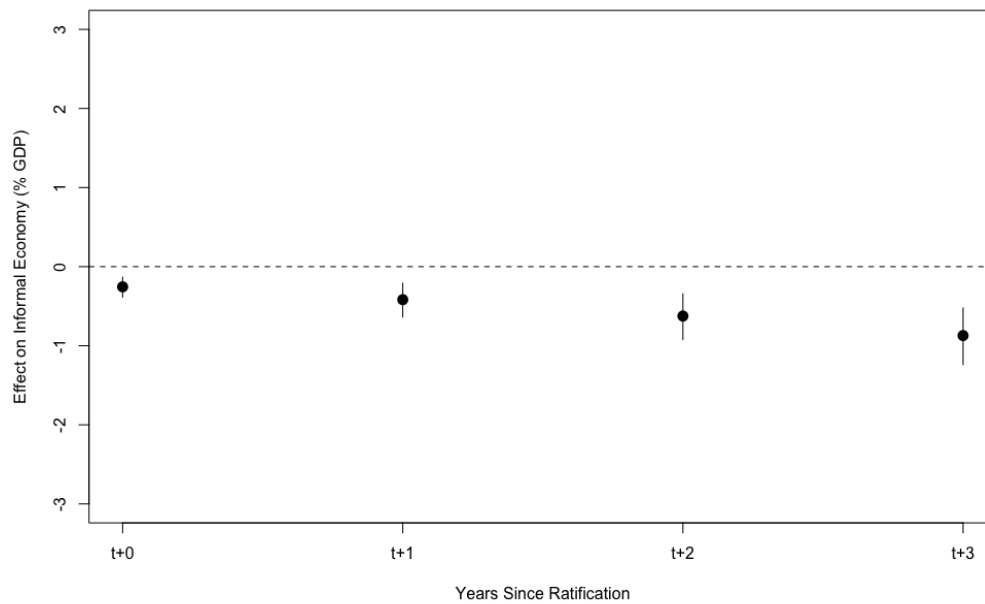
¹⁴ Temporal matching of controls was also used during preprocessing, which reduces the chance for spillover effects in addition to creating more realistic matches for counterfactual comparison.

¹⁵ The bootstrap method with 10,000 iterations was used to generate standard errors.

¹⁶ Specifically, CEDAW ratification was estimated to reduce the size of the informal economy by 0.87% of GDP.

the quantity and quality of public goods and services, in addition to helping individuals escape the precariousness often associated with informal work.

Figure 4. Estimated Effect of CEDAW Ratification on Informal Economic Activity Over Time



For a more substantive example, consider the case of our highlighted matched set from earlier, India, which ratified CEDAW in 1993. India's estimated informal economy size in 1993 stood at 26.2% of GDP and dropping to 25.2% three years later in 1996, resulting in a 1% reduction over a three year period. This decrease in the size of the informal economy resulted in roughly \$3.9 billion in additional taxable revenue for the Indian people¹⁷.

Moving from the global sample to regional effects, Table 1 below shows the results of CEDAW ratification on the size of the informal economy for both the global sample and different regions at the end of the treatment window. As a reminder, hypotheses 3 and 4 suggests a minimal reduction, if any, of ratification on the informal economy for mineral¹⁸ rich countries and a much smaller reduction in OECD¹⁹ countries compared to the global sample. Just as in the main analysis, the same matching and weighting

¹⁷ According to World Bank Estimates, India's GDP in 1996 was 392.9 billion (current US\$).

¹⁸ Specifically, mineral rich countries include Saudi Arabia, Kuwait, Oman, Algeria, Libya, Chile, Botswana, Gabon, Mauritania, Nigeria, Azerbaijan, Russia. Similar results were found when limiting the analysis to MENA countries.

¹⁹ OECD countries consists of all OECD members in the sample prior to 1980.

techniques were utilized, and a moderating dummy variable was entered into the diff-in-diff analysis to show CEDAW ratification's effect on each region. As shown in Table 1, CEDAW ratification has an insignificant effect on the size of the informal economy for countries rich in mineral wealth, giving evidence to the possible Dutch Disease argument put forward by Ross (2008) and offering support for hypothesis 3. On the other hand, CEDAW ratification appears to significantly reduce the size of the informal economy in OECD countries, with an estimated drop of about 0.60% to GDP, roughly about 30% less than the drop estimated for the global sample as argued in hypothesis 4. However, given the sizable economies found in many OECD countries, this modest drop still equates to billions of dollars in additional taxable revenue that otherwise would have been lost to the informal economy, in addition to the normative benefits gained by individuals moving out of the informal sector.

Additionally, Table 1 also shows the results from countries in Latin America, Eastern Europe, sub-Saharan Africa, and Asia, thus allowing me to test hypotheses 5 and 6. Regarding Eastern Europe, results are statistically indistinguishable from zero with a standard error nearly double the size of the coefficient estimate. Taking a deeper look at Eastern Europe, informal economic activity was especially high during the 1990s and early 2000s as many countries began to rebuild following the collapse of the Soviet Union. One possible reason for this finding is that in many former Soviet Republics, women weren't prohibited from formal employment, thus CEDAW ratification didn't eliminate formal barriers to employment as in other parts in the world. Rather, high levels of corruption mixed with the inability to enforce many laws in Eastern European countries (Fogel, 1994) could plausibly explain reasons for the high levels of informality found in places such as Georgia, which had an estimated informal economy size around 81% of GDP in 1994. Although speculative, in the Appendix I show that if I were to extend the post-treatment window for Eastern European countries from 3 years, as shown here, to 8 years to allow for the buildup of bureaucratic capacity, CEDAW results in a significant decrease in the size of informal economies starting at 7 years post ratification.

Turning to other regions throughout the world, ratification results in a significant decrease in the size of the informal economy in both sub-Saharan Africa and Latin America. In sub-Saharan African,

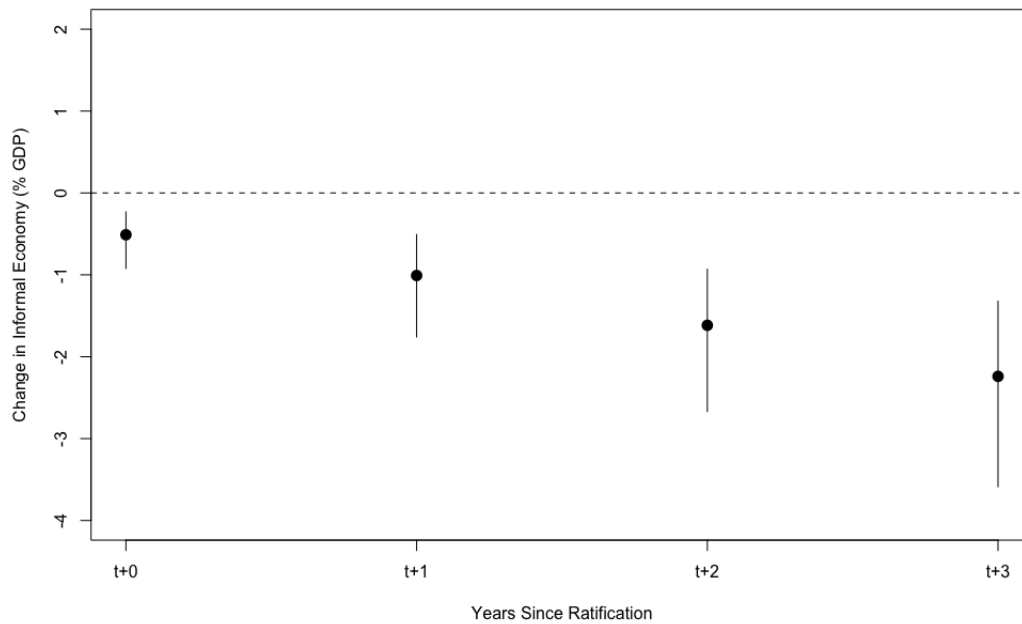
CEDAW ratification is estimated to decrease the size of the informal economy by roughly 0.6% of GDP, significant at the .10 level. For Latin America, ratification results in a larger decrease in informality with a point estimate of about 0.86% to GDP, roughly equal to that of the global sample, and is significant at the .05 level. Lastly, the largest reduction in informality can be seen in Asia as shown in Table 1 and Figure 5. For ratifying countries, CEDAW results in an immediate and statistically significant decrease in the size of the informal economy and continues to decline throughout the remainder of the post-treatment window, with an estimated decrease in the size of the informal economy by roughly 2.24% of GDP three years after ratification, significant at the .01 level. It is important to remember that many of these regions have a history of patriarchal norms, however they all experienced different economic growth rates over time, with many Asian countries experiencing very high levels of growth due to their export-oriented manufacturing industries. This rapid growth, in addition to reducing barriers towards women in the workforce, resulted in a decrease in informality as women who could only find informal work moved into many of the textile industries in search of formal employment.

Table 1. Estimated Effect of CEDAW Ratification on the Size of the Informal Economy

Global and Regional Estimates			
Sample	T+3 Estimate	Std. Error	95% Conf. Intervals
Global	-0.87***	0.18	[-1.24 – -0.52]
Mineral Countries	-0.03	0.66	[-1.38 – 1.22]
OECD Countries	-0.60**	0.29	[-1.27 – -0.13]
Asian Countries	-2.24***	0.41	[-3.14 – -1.53]
Latin American Countries	-0.86**	0.41	[-1.67 – -0.06]
Eastern European Countries	-0.39	0.65	[-1.63 – 0.91]
Sub-Saharan African Countries	-0.60*	0.33	[-1.27 – 0.02]

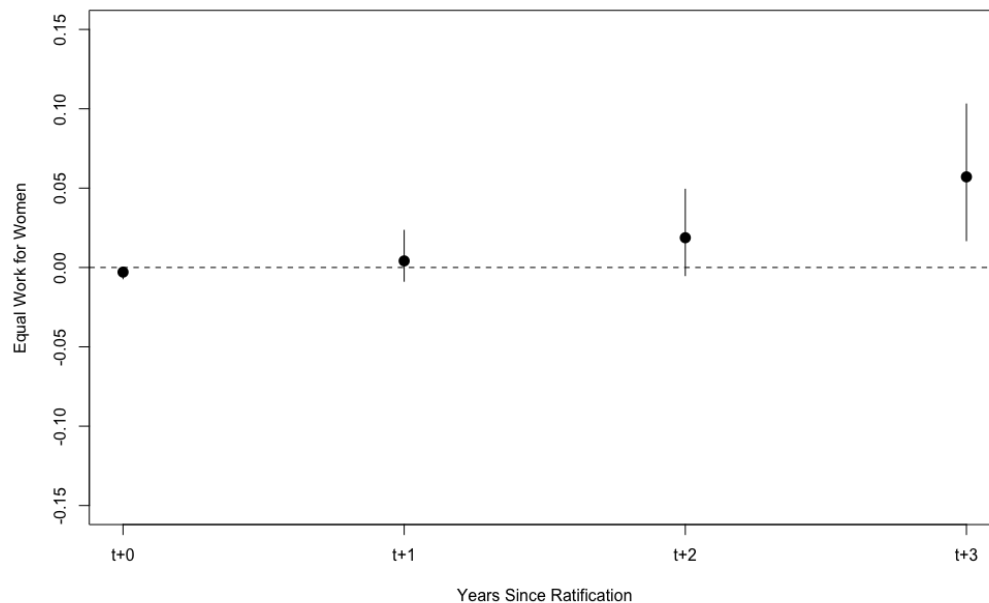
Note: Bootstrapped std. errors with 10,000 iterations; * p<0.10 ** p<0.05 *** p<0.01

Figure 5. Estimated Effect of CEDAW Ratification on Asian Countries



Lastly, hypothesis 2 argues that the mechanism through which ratification affects informal economic activity is via the reduction of formal legal barriers against women's employment. Above I argued that discrimination towards women working legally results in their employment in the informal economy, however if CEDAW is eliminating formal barriers, then we should see evidence of women being able to attain employment on an equal basis to their male counterparts for those countries who ratify. To test whether this is the case, I performed an additional matching and diff-in-diff analysis for the global sample on CEDAW's effect on women obtaining work on an equal basis with men. Figure 6 below shows that by the end of the 3-year post treatment window, ratifying countries had a positive and significant increase in the ability for women to get a job in the same way as men compared to control groups, thus lowering formal barriers to entry that previously existed and offering support for hypothesis 2.

Figure 6. CEDAW's Effect on Equal Work for Women



In summary, the results above offer supporting evidence for hypotheses 1 through 6. CEDAW ratification reduced the size of the informal economy throughout most regions in the world, with the main mechanism being the reduction of official barriers to legal employment for women. One caveat to this study is the lack of data for the temporal span used here on informal economic activity by gender. However, I argue that the results are consistent with my theory for two main reasons. First, it seems unlikely that a global treaty protecting the rights of women would result in men leaving the informal sector, and thus contributing to the overall decrease in informal economic activity. Given that CEDAW specifically lays out protections for women, men who work informally are more than likely doing so not because of the “exclusion channel” as mentioned here, but for reasons more related to the “exit channel” such as avoiding high tax burdens or market regulations. Secondly, I theorize and show where heterogeneous effects of ratification should exist due to economic orientations such as the export-oriented industries found in Asia, modern day Dutch Disease occurring in mineral rich countries, or regions that previously adhered to more equality between men and women such as many OECD countries. Given

these conditional expectations of the theory, it is difficult to explain the regional variation we see in informal economic activity if CEDAW ratification had no effect on women moving out of the informal economy as I propose here.

Robustness Checks

While both the main and regional analyses offer evidence that CEDAW ratification plays an important role in lowering informal economic activity, it is prudent to test the robustness of results utilizing different lag lengths on pre-treatment history. To this end, I re-ran the diff-in-diff estimation incorporating a lag length of 5 years and utilizing CBPS weighting techniques. The results²⁰ using a 5 year lag and a 3 year post-treatment window for the global sample, remain similar to the main analysis albeit weaker and only significant at the .10 level. However, when expanding the post-treatment window out to 5 years with a 5 year lag on pre-treatment covariates, the results mimic the main analysis and are significant at the .05 level.

Alternative Matching Methods

Covariate Balancing Propensity Score weighting has been shown to offer good balance and reduce bias; however, inference would be threatened if results hinged exclusively on this type of matching algorithm. To address this concern, I conducted additional analyses utilizing the more traditional propensity score weighting as well as Mahalanobis distance matching with a matched set size of 2. Mahalanobis distance matching²¹ approximates a fully blocked experimental design which often has more power, efficiency, robustness, and less imbalance compared to a completely randomized experimental design (King & Nielsen 2019). This method creates a set of 2 weighted control units per treated unit that have the shortest distance between any two column vectors in the sample covariance matrix (Sekhon

²⁰ Plots of the results utilizing different lag lengths and leads can be found in the Appendix.

²¹ The distance used in MDM is similar to Euclidean distance with the exception that all the variables are standardized and then matches are performed on each treated unit to the nearest control unit(s).

2007), or as stated by Rubin (1980), attempts to find paired matches close on all matching variables. The outcome for both alternative matching techniques can be found in the Appendix and show CEDAW ratification results in a reduction in the size of the informal economy and is significant at the .05 level. For the analysis utilizing propensity score weighting, the estimated reduction in the size of the informal economy sits at 0.41 % of GDP, while the analysis using Mahalanobis²² matching estimates the reduction to the informal economy at 0.45 % of GDP.

Alternative Matching Variables

Due to limitations on the temporal span of the original Cingranelli and Richards human rights data, I opted to match and balance countries on similar variables from the World Bank for women's access to credit and property ownership, as well as a variable measuring exclusion (inclusion) towards women in governed spaces from the Varieties of Democracy Institute. Although not regularly used in the human rights literature, I argue that these variables were justified in their replacement of CIRI Human Rights variables given the lag length needed for matching and balancing on pre-treatment covariates. However, any conclusions drawn from the analysis would be severely weakened if the results were dependent on the specific variables chosen in the main analysis yet do not hold up to other variables measuring similar concepts. To test this possibility, I conducted an additional analysis utilizing the Women's Economic Rights variable from the November 2022 CIRIGHTS (Brendan, Cingranelli, & Filippov 2022) dataset²³. Similar to the Women's Economic Rights variable in the original CIRI Human Rights Data²⁴, this variable captures a slew of internationally recognized rights including equal pay, free choice of profession without the consent of a male relative, gainful employment, equality in hiring or promotions, and non-discrimination by employers, in addition to many other economic rights for women.

²² It should be noted that balance for Mahalanobis matching was notably worse than the balance achieved in both propensity score weighting and CBPS weighting analyses.

²³ Version 1.25.22.11 extends the original CIRI dataset up to the year 2022, data and codebook can be accessed directly from <https://cirights.com>.

²⁴ The original CIRI Human Rights Data Project ended in 2011.

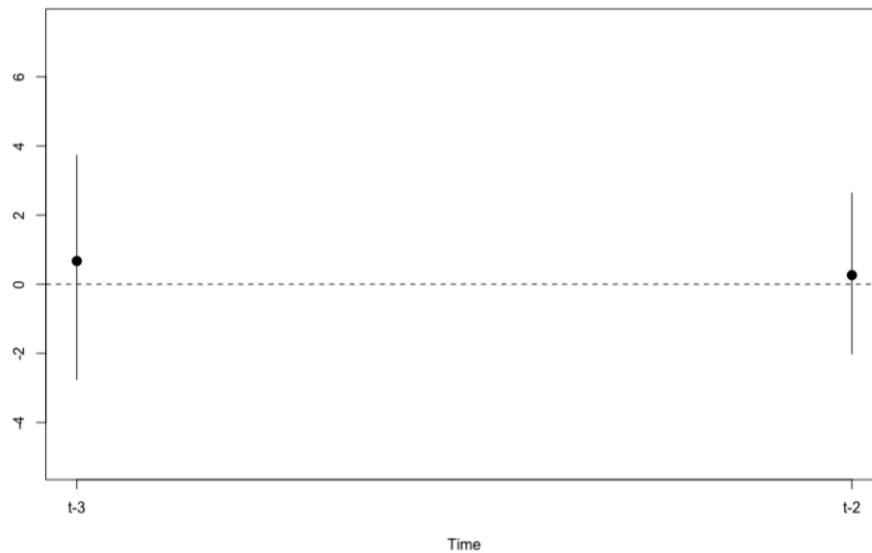
After incorporating the new CIRIGHTS variable in place of the aforementioned VDEM and World Bank variables, I performed a CBPS weighting and a difference-in-differences analysis similar to the main analysis above, which produced similar results to both the main analysis and the results found using alternative matching techniques. More specifically, CEDAW ratification results²⁵ in a significant reduction in the size of the informal economy at two years post-ratification and stays significant throughout the remainder of the post-treatment window, with an estimated reduction in the size of the informal economy of 0.43% of GDP. The results here lend further confidence to those found in the main analysis and shows that CEDAW's effect on the size of the informal economy is robust to both variable selection and matching methods.

Placebo Test

Another potential threat to the analysis is the possibility that a reason other than CEDAW ratification is driving the results I find. In this scenario, instead of reducing official barriers towards women in the workplace after CEDAW ratification, something else is occurring and ratification is simply coinciding with decreasing levels of informality among the sample. To address this, I conducted a placebo test wherein I matched countries on all the same covariates in the original analysis minus the outcome variable (the size of a country's informal economy) using CBPS weighting and a 3 year lag. The goal of this placebo test is to alleviate potential concerns by showing that a treatment effect does not exist when we wouldn't expect it to. Specifically, the test below in figure 7 shows the effect of CEDAW ratification on prior outcomes of informality (in other words, the change in informality at time t-1 compared to informality at times t-2 through t-3). As expected, the results of the placebo test generates estimates that are statistically indistinguishable from zero, giving further confidence in the results from the main analysis.

²⁵ A plot of the parallel trends and the results of the CIRIGHTS analysis can be found in the Appendix.

Figure 7. CEDAW and Informal Economies – Placebo Test



International Treaties as a Signaling Device

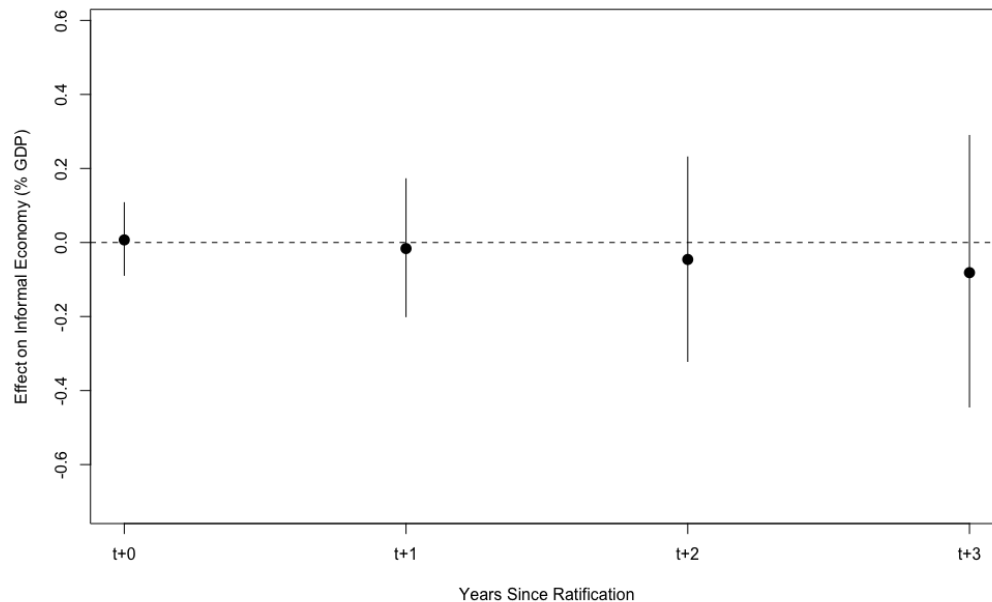
Lastly, there's the possibility that a reduction in the informal economy is the result of signing any international treaty rather than CEDAW specifically. In this scenario, rather than increasing women's rights and facilitating movement out of the informal economy as I argue, ratification of treaties act as a signaling device to the international community. The logic for this potential explanation rests in the fact that by ratifying popular treaties, countries signal to potential investors that they are a good place to do business with. Once a country ratifies and sends out this signal, different forms of investment would come into the country, thereby creating new jobs, and possibly lowering levels of informality.

If ratification of any international treaty is lowering informality, rather than CEDAW specifically, then we should see similar results in the data. To investigate whether this is the case, I performed an additional analysis replacing CEDAW ratification with a dummy variable indicating when countries ratified the Convention Against Torture (CAT) taken from Ryckman (2016). Similar to the main analysis, countries were matched on all of the same covariates utilizing CBPS Weighting with a 3-year lag²⁶.

²⁶ A parallel trends plot for the CAT analysis can be found in the Appendix.

Figure 8 below shows the estimated effect of CAT ratification on levels of informality is statistically indistinguishable from zero, offering evidence to my argument that CEDAW ratification specifically, rather than treaty ratification in general, helps explain lower levels of economic informality.

Figure 8. Estimated Effect of CAT Ratification on Informality



Conclusion

Do human rights treaties change economic outcomes? In this study I ask whether CEDAW ratification has an effect on the size of a country's informal economy. Utilizing a new matching and difference-in-differences design for TSCS data, I show that ratification results in a robust and significant reduction of the informal economy when observing a three year post-treatment window. In the analysis of a global sample, ratification accounted for a decrease in the size of the informal economy by nearly 1% of GDP, however ratification also has heterogeneous effects. More specifically, ratification was shown to decrease the size of the informal economy in OECD countries, Latin America, sub-Saharan Africa, and

Asia, with Asian countries having the largest decrease in the sample. In contrast, CEDAW ratification has an insignificant effect on the size of the informal economy in mineral rich countries, possibly due to the change in economic orientation brought on by natural resources, as well as in eastern European countries. Additionally, I show that the mechanism by which ratification lowers informality is through the reduction of official barriers to employment for women, thus allowing those who previously could only find employment in the informal sector, seek formal work. Moreover, the results found above are robust to different matching methods and variables used in the matching process, as well as a placebo test to make sure an effect isn't occurring when we wouldn't expect it to. Lastly, I show that it is CEDAW specifically, and not just any human rights treaty, that is causing a decrease in the size of the informal economy as shown in the analysis on the Convention Against Torture.

The average outcome for countries who ratified CEDAW resulted in millions, if not billions, of additional taxable revenue, thereby increasing the ability of countries to provide much needed goods and services to their populations. In addition to increases in a country's tax base, moving women out of the informal economy is normatively desirable as it often leads to less dangerous work, better pay, lower rates of poverty and inequality, as well as better personal, political, and economic empowerment. Additionally, I argue and show that the mechanism by which CEDAW ratification reduces the size of the informal economy works by dismantling official barriers towards women in the workplace, thus enabling those who were previous excluded to the informal economy to gain formal employment. Given the disproportionate number of women in the informal economy, understanding the determinants of informal work has become an increasingly salient subject for academics, international financial institutions, and those in the international human rights regime. Future research could test the mechanism here on other human rights treaties, or researchers could see if multiple mechanisms are at work regarding CEDAW's effect on the economy, such as survey based views on women in the workplace.

To my knowledge, this is the earliest work that explicitly links a human rights treaty to the size of a country's informal economy. Thus, I shed light on the effects of international human rights treaties on economic outcomes as well as generate new insights and exciting avenues for future research.

Importantly, future researchers should consider broadening their horizons and exploring other areas affected by human rights treaties beyond the traditionally used indicators frequently found in work on human rights. By linking human rights treaties to outcomes that traditionally fall outside the purview of human rights scholars, in this case informal economic activity, human rights and informal economy scholars can develop a better understanding of the intricacies surrounding the effects of international treaties. To this extent, future researchers should find innovative ways to test the effects of the human rights regimes on other aspects not traditionally approached in the field.

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