

Breaking Barriers: How an International Treaty for Women Reduces the Size of the Informal Economy

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Abstract

What effects do international treaties have on domestic outcomes? Scholarly debate around this topic often hinges on a country's motivations to ratify. While these debates are important, many international agreements have downstream consequences that are often overlooked in the literature due to their peripheral role in ratification decisions. In this paper I highlight a particular downstream consequence for countries who ratify the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW). I argue CEDAW ratification plays a meaningful role in reducing the size of the informal economy by lowering formal barriers to women's employment. Through matching within a difference-in-differences (DID) design for time-series cross-sectional (TSCS) data, I show countries that ratify CEDAW experience a significant decrease in the size of the informal economy starting at three years after ratification. These results hold under multiple robustness checks and placebo tests. These findings have important implications for countries, individuals, and the field of international relations. By demonstrating important peripheral outcomes that are arguably not core to ratification decisions, I shed light on the long debated topic of the role international agreements have on domestic outcomes and their influence on equitable and sustainable development.

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What effects do international treaties have on domestic outcomes? This question has long been debated by scholars of international relations. Some have argued that treaties matter for constraining state behavior (Simmons 2000; Simmons and Hopkins 2005), as opposed to simply screening out non-compliers ahead of time (Downs, Rocke, and Barsboom 1996; Von Stein 2005), while others have argued that international treaties have mostly failed to produce any effects at all (Hoffman et al. 2022). Perhaps one of the most prominent areas where this debate takes place involves the signing of human rights treaties. Here, too, scholars have been split on whether the ratification of human rights treaties improves outcomes (Fariss 2014; 2019) or if they are ineffectual (Hafner-Burton and Tsutsui 2007), resulting in little or no improvements to human rights protections (Cingranelli & Filippov 2018). While these debates are important, it is essential to note that many international agreements have downstream implications that are not central to a country's decision to ratify. In other words, even if countries are screening into human rights agreements, there may be important consequences that are peripheral to the core issues that motivated a country to ratify. By failing to account for these downstream effects, political scientists run the risk of overlooking the full scope and effects these treaties have on domestic outcomes.

Consider the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW), one of the most ratified human rights treaties in the world. CEDAW's stated goal is the elimination of discrimination against, and the promotion of equal rights for, women. In short, CEDAW's aim is to bind states to empower women and put them on an equal playing field with men. Previous research investigating CEDAW has found mixed outcomes, with results pointing to increases in political rights and moderate increases to social rights, yet no discernable effect on women's economic rights (Englehart and Miller 2014; Hill 2010). Given this, it would appear that CEDAW has failed to help out women economically. However, I argue we may be misinterpreting

the value CEDAW has for women's economic outcomes because of two reasons. First, restricting our attention to specific indicators while ignoring the downstream consequences these agreements have leaves political scientists with an incomplete understanding of CEDAW's broad effects. Second, recent methodological advances in time-series cross-sectional (TSCS) analyses enables greater insight into CEDAW's effect on economic outcomes than previous research has allowed.

In this paper, I focus on CEDAW's impact on informal economic activity¹ – unregistered and untaxed legal activities deliberately concealed from public authorities – which comprises over two billion people globally. In addition to negative effects on the provision of public goods (Schneider 2005), informal employment often includes dangerous working conditions and increases both poverty and inequality (Bonnet, Vanek, and Chen 2019; Deléchat and Medina 2021; Malta et al. 2021). Moreover, understanding the determinants of informal work is especially important for women's development given that in many parts of the world women are underrepresented in the formal economy (World Bank 2022a), and overrepresented in the informal economy (Deléchat and Medina 2021). I contend that although most countries are joining CEDAW for a variety of reasons, its effect on informal employment is not core to ratification concerns. Nevertheless, CEDAW ratification plays a meaningful role in reducing the size of the informal economy. While CEDAW's effect on the informal economy may work through more than one causal channel, I argue that an important mechanism involves the reduction of legal barriers towards women's formal employment. The removal of these barriers enables women, many of

¹ Also known as informality, informal employment, the shadow economy, and shadow or underground economic activity.

whom were previously forced to work informally, to gain employment in the formal sector, resulting in an overall decrease in the size of the informal economy.

To test my argument, I incorporate matching within a difference-in-differences design for time-series cross-sectional data recently developed by Imai, Kim, and Wang (2021) to capture the effects of ratification on the size of the informal economy. In the results section, I show that after matching countries on treatment, outcome, and covariate histories, CEDAW results in a significant reduction in the size of the informal economy starting around three years after ratification. Moreover, I show that CEDAW ratification is responsible for a positive and significant increase in women's legal capacity to work, giving evidence towards my proposed mechanism of a reduction in formal barriers for women in the workforce. These results hold under a variety of different robustness checks including different lag and lead lengths, alternative matching methods and matching covariates, as well as placebo tests.

These findings have important substantive implications for both individuals and countries. The decrease in informal economic activity implies workers move from the informal to the formal sector, yielding additional taxable revenue for public goods provision. However, increases in a country's tax base are not the only benefit of ratification. Reducing informal employment is normatively desirable as it often leads to less dangerous work and lower rates of poverty and inequality. Moreover, given the disproportionate number of women working informally on a global scale, reducing gender disparities in the workforce has become a focus for both academics and international organizations (Deléchat and Medina 2021; World Bank, n.d.).

This work contributes to research on several different dimensions. For scholars of both international relations and human rights, I shed light on the debate around the effects that international agreements have on domestic outcomes. By demonstrating how these agreements

change important peripheral outcomes that are not core to ratification decisions, I add to our understanding of the broad, and possibly overlooked, effects these treaties have. Additionally, by explicitly linking an international human rights treaty to the size of a country's informal economy, I add to both the informal economy and development literatures on the causes and consequences of informal work, while highlighting an additional pathway to sustainable growth.

Human Rights and Treaty Ratification

Downs, Rocke, and Barsoom (1996) famously argued that states comply with international agreements simply because these agreements mirror state preferences and interests. The conclusion of the argument is that entry into international agreements is an entirely endogenous act, resulting in little to no change in state behavior. Under this logic, treaties tend to “screen out” non-compliers ahead of time, leaving those who do ratify essentially in the same position had the treaty never existed at all.

Previous work on human rights treaties calls this assumption into question. If screening effects were the only reason states choose to ratify international treaties, then as Vreeland (2008) notes, we would expect to observe high or perfect compliance. However, Hathaway (2001) finds that countries with some of the worst human rights records often ratify human rights treaties at very high rates. One answer to this puzzle points to the political institutions present in autocratic countries (Vreeland 2008), while alternative explanations propose a “window dressing” argument (Hafner-Burton and Tsutsui 2005). In the latter scenario, due to normative expectations around human rights, countries ratify treaties to appease international actors while never having the intention or the capacity to improve their practices. The end result of such scenarios gives the impression that human rights treaties are ineffectual and have failed to produce their intended effects.

The possibility of an appeasement type of scenario is especially high concerning CEDAW, given that out of 194 U.N. member countries, 187 have ratified the treaty (Verveer and de Silva de Alwis 2021). However, previous work by Englehart and Miller (2014) and Hill (2010) calls the window-dressing scenario into question. Both works find CEDAW ratification leads to positive improvements for women's political and social rights, yet no substantial effect on improving women's economic situation.

Given previous findings, it would appear CEDAW has failed to help out women economically. However, I argue we may be misinterpreting CEDAW's full effect by ignoring the downstream consequences and observable implications that comes with ratification. In particular, I draw attention to one important and often overlooked economic factor that impacts women's lives: work in the informal economy. I argue that CEDAW helps to reduce the size of the informal economy by compelling governments to eliminate legal barriers towards women's employment, thereby enabling women to move out of the informal economy and into the formal sector.

CEDAW and the Informal Economy

The worldwide informal economy is surprisingly large, consisting of roughly 61% of the global workforce (Deléchat and Medina 2021). High levels of informal economic activity often result in detrimental outcomes. In addition to the negative effects mentioned above, large informal economies can distort macroeconomic indicators on income and unemployment rates. These distortions result in incorrect economic estimates being sent to officials and international organizations, which in turn implement policies based on this incorrect information (Elgin and Oztunali 2012). Ultimately a large informal economy acts as an obstacle to inclusive and sustainable growth, so that many countries grow well below their true potential (Georgieva 2021; La Porta and Shleifer 2008; 2014).

Researchers studying the informal economy often point to two channels through which people or firms become informal, that of “exit” or “exclusion” (Perry et al. 2007; Tokman 2007). In the “exit” channel, firms and individuals work informally due to high market entry costs, lack of formal market competition, high tax burdens, poor institutional quality, or strict product and labor market regulations (Perry et al. 2007; Schneider and Enste 2000; Schneider and Williams 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, but they are excluded due to legal or employment barriers, reduced labor protections, or a lack of property rights (Devine 2021).

I argue that CEDAW ratification plays a meaningful role in reducing the size of the informal economy by addressing one aspect of the exclusion channel that leads to informal work – formal employment barriers for women. Women are often the largest excluded group in the world, having on average three-quarters of the rights of men (Hyland, Djankov, and Goldberg 2020). Exclusionary or discriminatory policies towards women often result in negative economic outcomes, such as large gender gaps in labor force participation (Lagarde 2014), high levels of employment in the informal sector (Farhan et al. 2016), as well as all around less favorable outcomes in the formal labor market (Hyland, Djankov, and Goldberg 2020). In many parts of the world, exclusionary policies include official restrictions on women’s employment or the permitted discrimination against women in the workforce. As a result of such policies, women have fewer formal employment opportunities, relegating them to work in the informal sector to provide for themselves and their families. In contrast, I argue that CEDAW helps to address these exclusionary policies, thereby facilitating movement out of the informal sector and into formal employment. Specifically, articles 11 and 13 of CEDAW 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 (United Nations General Assembly 1979). When countries ratify CEDAW, they publicly commit to both domestic and international audiences to rectify barriers towards women's rights. After ratification, countries bind themselves to put both the treaty provisions into practice while also promising to submit periodic reports on steps taken to comply with their obligations (United Nations n.d.). This commitment opens countries to both coordination and monitoring activities, enabling IOs and non-governmental organizations (NGOs) to hold governments accountable through a variety of strategies such as educational programs, public naming and shaming, and domestic judicial processes.

To see how international treaty obligations change domestic practices, consider Nepal, which ratified CEDAW in 1991. Although the Nepal Treaty Act of 1990 states that international treaty provisions supersede existing domestic laws in the case of conflict (United Nations n.d.), many members of the judiciary were unaware of their country's obligations under CEDAW. This ignorance often resulted in discriminatory rulings against women such as in the Meera Dhungana case of 1994, in which judges referenced social norms and value systems in their refusal to provide equal property rights (Pandey 2013).

Given the disconnect between Nepal's obligations under CEDAW and domestic legal outcomes, the NGO Pro Public worked to bring about women's rights litigation, as well as legal education programs for the judiciary. These programs, in tandem with legal challenges, worked to strike down many Nepalese laws and customs that were found to be discriminatory against women. In fact, after completing the educational program, the same judges in the aforementioned Meera

Dhungana case reversed course and ruled in favor of women's economic rights in a later case involving recruitment discrimination against Royal Nepal Airlines Corporation (Pandey 2013).²

Although anecdotal, the above scenario offers one example how these processes help governments fulfill their obligations under CEDAW and promote women's equality. Importantly, conversations in Nepal and many other countries surrounding CEDAW do not mention addressing the size of a country's informal economy when considering ratification. Rather, acts such as systemic forms of violence against women (Mehra 2013), or discriminatory practices in inheritance (Hallward-Driemeier and Hasan 2012), adoption, and divorce laws (Pandey 2013) propelled domestic groups to want reform. Nevertheless, I contend that these reforms resulted in downstream consequences that play a meaningful role in reducing the size of the informal economy.

Importantly, I argue CEDAW's effect on the informal economy shouldn't be expected to happen immediately for multiple reasons. First, and perhaps most importantly, domestic litigation against discriminatory laws can take years to resolve in a country's legal system. Secondly, the timing of periodic national reports means that monitoring, coordination, and program implementation from both IOs and NGOs is delayed until well after a country ratifies CEDAW. Lastly, the often slow moving nature of many state bureaucracies can result in slowed policy implementation, thereby delaying any effects attributed to CEDAW until years after ratification. In short, policy change(s) due to CEDAW ratification may realistically need time to penetrate the courts, bureaucracies, and society before we start to see its effects. Due to these dynamics, I argue

²See Reena Bajracharya v. His Majesty's Government of Nepal (May 2001)

we should expect a delay of a few years before CEDAW ratification makes an impact on the informal economy.

Lastly, CEDAW's effect on the informal economy more than likely works through many different causal channels, however, I argue that one key mechanism is the elimination of legal barriers to formal employment for women. The direct implication of this process is that women gain better access to formal work, and have reduced incentives to work informally, resulting in an overall decrease in the size of a country's informal economy.

In summary, throughout many parts of the world, women are underrepresented in the formal economy and overrepresented in the informal economy, often due to official barriers to employment. In contrast, CEDAW ratification should address and help eliminate these barriers by way of domestic legislation and constant interaction between governments, IOs, and NGOs. As a consequence, women face fewer constraints to formal work, resulting in an overall decrease in informal economic activity. If true, in addition to CEDAW ratification lowering the size of the informal economy, we should see an increase in the share of women who do not face legal employment barriers in ratifying countries. Given this, I propose the following two hypotheses:

H1: CEDAW ratifying countries will experience a reduction in the size of the informal economy relative to countries that do not, or have not yet, ratified.

H2: CEDAW ratifying countries will see an increase in the share of women who do not face legal employment barriers relative to countries that do not, or have not yet, ratified.

Heterogeneity in Treaty Impact on the Informal Sector

Ratification of CEDAW might have heterogeneous effects on the size of the informal economy in different countries for a variety of reasons. As mentioned, most people work informally due to reasons found in the “exit” or “exclusion” channels, with CEDAW helping to solve one problem in the “exclusion” channel. Given this, CEDAW should lower informality when women are excluded from formal employment due to discriminatory practices. However, formal barriers may not be the main constraint on women’s workforce participation in every country. Rather, I expect the effect of CEDAW ratification to be more pronounced in different subgroups due to a variety of local conditions. For example, Ross (2008) argues that oil rich countries often suffer from what he refers to as a modern form of Dutch Disease, 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, resulting in movement away from traded sectors that traditionally employ women (such as export-oriented manufacturing sectors) and towards nontraded sectors that traditionally employ men (such as construction and services). This logic suggest that women may be less likely to participate in the labor force due to economic composition rather than formal exclusion. If this is the case, we should expect CEDAW to have less of an effect on the informal economy in countries largely dependent on oil. Conversely, for those countries not dependent on oil exports, I argue we should expect CEDAW ratification to play a meaningful role in reducing informality. This leads to Hypotheses 3a and 3b regarding CEDAW’s effect on the informal economy.

H3a: CEDAW ratification will have a minimal effect, if any, on the size of the informal economy in countries dependent on oil.

H3b: CEDAW ratification will have a negative effect on the size of the informal economy in countries not dependent on oil.

Additionally, I argue we should expect ratification to have a strong negative effect among subgroups of countries with strong export-oriented manufacturing sectors. The reasoning here rests on the fact that in many parts of the world, manufacturing industries seek to employ women in occupations such as textiles, garments, plastics, and electronic goods (Ross 2008). Moreover, export industries by nature sell to a global market, which can result in quick growth and the production of a large number of jobs (Ross 2008). This means these industries can face labor demands that cannot be satisfied by men alone. With barriers in place, women may be forced to work informally in any number of sectors. However, once barriers are eliminated, countries with large export-oriented manufacturing sectors will be able to tap into this previously unavailable labor resource, or more likely, incorporate previously informal women into the formal workforce. The end result will see a decrease in the overall size of the informal economy for these particular countries. On the other hand, for those countries with small export-oriented manufacturing industries, this opportunity for women may not be present. While CEDAW ratification should still result in a reduction of formal barriers to work for women in this group of countries, the effect may not be as pronounced due to a lack of opportunities for women in the workforce. Hence, we should expect ratification to have a negative effect on the size of the informal economy for countries that have large export-oriented manufacturing sectors, and a minimal effect, if any, on countries with medium-to-small export-oriented manufacturing sectors.

H4a: CEDAW ratification will have a negative effect on the size of the informal economy in countries with large export-oriented manufacturing sectors.

H4b: CEDAW ratification will have a minimal effect on the size of the informal economy in countries with medium-to-small export-oriented manufacturing sectors.

Lastly, I argue we should expect ratification to have heterogenous effects based on how much “room-for-improvement” a country has. If CEDAW leads to reduced informal economic activity by addressing exclusionary barriers, as I argue here, then barriers must be present to begin with. Countries that are more inclusive towards women prior to ratification should experience a “ceiling effect” (Margalit 2013), leading to a much smaller effect on the size of the informal economy, given that parts of the exclusion channel are already remedied. In other words, for countries with previously held norms of gender *inclusion*, ratification should result in a minimal impact on informal employment. Conversely, I expect countries that are more *exclusive* towards women prior to CEDAW ratification to have ample “room-for-improvement,” leading to a decrease in the size of their informal economy after ratification. This “room-for-improvement” argument leads to Hypotheses 5a and 5b regarding CEDAW’s effect on the size of the informal economy conditional on previous levels of inclusion or exclusion towards women.

H5a: CEDAW ratification will have a minimal effect, if any, on the size of the informal economy in countries that exhibit high levels of inclusion towards women prior to ratification.

H5b: CEDAW ratification will result in a decrease in the size of the informal economy in countries that exhibit exclusionary policies towards women prior to ratification.

Research Design

To test CEDAW's effect on the informal economy, I employ matching, and a difference-in-differences analyses on a time-series cross-sectional sample of 146 countries from 1978-2012,³ with the unit of observation being a country-year. To account for possible selection effects that could threaten the ignorability of treatment assignment, I collect numerous potentially confounding covariates during the matching process that might affect both treatment and outcome variables. In other words, countries that ratify CEDAW are matched with similar countries that did not, or had not yet ratified, on confounding covariates and outcome histories. After matching, I perform a difference-in-difference analysis for the change in the size of the informal economy for ratifying country_i, compared to their matched controls.

Dependent Variable

The outcome of interest is the size of a country's informal economy, measured as a percent of official GDP. Specifically, I use the measure developed by Elgin and Oztunali (2012)⁴ and gathered from Blanton, Early, and Peksen (2018). To produce estimates of informal output, Elgin

³ Data on the dependent variable used in this study ends in 2012. Nearly every country that has ratified CEDAW did so prior to 2012, with only three countries having ratified the treaty after 2012 (Nauru, Palestine, and South Sudan).

⁴ The DGE model used by Elgin and Oztunali (2012), along with the MIMIC model (Schneider, Buehn, and Montenegro 2010), are the two most used datasets employed by various international organizations such as the World Bank and the IMF when studying informal economies.

and Oztunali use a deterministic general equilibrium (DGE) model in which representative households choose between two productive technologies, formal and informal. By matching various macroeconomic proxies, Elgin and Oztunali solve the model and generate an estimate of the size of the informal economy in a given country-year.⁵ The estimated size of a country's informal economy varies greatly in the sample from a low of 7.96% of GDP for Switzerland in 2012, to a high of 81.69% of GDP for Georgia in 1994.

To test my proposed mechanism of reduced formal barriers towards women in the workplace, I incorporate an indicator measuring whether there are restrictions on a woman's legal capacity to get a job from the World Bank's Women, Business and the Law (WBL) report. The WBL database attempts to capture legal inequality that affects women's economic participation and opportunities. Like similar expert-based reports, the WBL database sends out questionnaires to over 2,000 respondents who are knowledgeable in aspects of family, labor, and criminal law, often consisting of lawyers, judges, academics, and members of civil society organizations (Hyland, Djankov, and Goldberg 2020).⁶ A particular strength of the WBL data is the scope and depth of its coverage, which includes 190 economies and goes as far back as the year 1970. This allows me to test the parallel trends assumption for reduced formal barriers for CEDAW's early adopters, while still offering reliable data until the end of the temporal span of the sample. Lastly, the WBL index has been shown to be correlated with better labor market outcomes for women (Hyland, Djankov, and Goldberg 2020), thus offering a useful measure to test both the mechanism

⁵ See Elgin and Oztunali (2012) for a detailed description of the model.

⁶ After questionnaires are returned, a team of legal experts at the World Bank performs a verification check to make sure the responses agree with legislative texts (Hyland et al., 2020).

and my overall theoretical expectations. This binary variable is coded 1 if there are no legal restrictions towards women in the workforce, and 0 if any of the following exist: “*a husband can prevent his wife from working; or permission or additional documentation is required for a woman to work but not a man; or 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 2022b)

Treatment Variable

To estimate CEDAW’s effect on the size of the informal economy, I used Hill and Watson’s (2019) coding of CEDAW ratification as my treatment variable. Countries take a value of 1 the year CEDAW is ratified (and every year after) and 0 otherwise. As mentioned previously, I expect the results of ratification to not be immediate due to the slow moving nature of legal challenges and policy changes, as well as the time needed for these changes to permeate through society. Given this, I opt for a post-treatment window of three years to estimate the average treatment effect on the treated (ATT). In particular, I investigate 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.

Covariates for Matching

An important confounding covariate in both the study of informality and human rights is regime type, with previous researchers finding significant effects pertaining to both economic and human rights outcomes (Hill and Watson 2019; Richards and Gelleny 2007; Teobaldelli and Schneider 2013; Vreeland 2008). Therefore, matching on regime-type characteristics enables more accurate comparisons on both the treatment and the outcome variables needed to causally identify CEDAW’s effect on the informal economy. To address this, I matched and balanced countries on

the Polity 2 index from the Polity V database developed by Marshall and Gurr (2022), which spans from -10 (most autocratic) to +10 (most democratic).

Additionally, the level of a country's economic development such as GDP per capita, Foreign Direct Investment (FDI), and Official Development Assistance (ODA) could plausibly influence respect for human rights, levels of informality, or CEDAW ratification (Deléchat and Medina 2021; Dell'Anno 2010; Hill 2010; Richards and Gelleny 2007). To account for these possible confounders, I matched countries on a variety of yearly economic indicators gathered from the World Bank's World Development Indicators (WDI) database (World Bank 2022c) including the log of GDP per capita (current 2015 \$US), the log of a country's Trade (% of GDP), Inflation (annual %), Unemployment (% total labor force, ILO estimate), Foreign Direct Investment (net inflows, % to GDP), net ODA received per capita (logged), and female labor force participation rate (% of population, ILO estimate).⁷

Furthermore, previous research has found that violent conflict can affect both human rights and informality (Blanton, Early, and Peksen 2018; Elbahnasawy, Ellis, and Adom 2016; Hafner-Burton and Tsutsui 2007; Hill 2010) since conflict can lead to more repression by governments and economic instability. To make sure countries are matched and weighted on this potential confounder, I followed Blanton, Early, and Peksen (2018) and incorporated their conflict intensity indicator originating from the UCDP/PRIO Armed Conflict Dataset (Gleditsch et al. 2002). This variable ranges from 0 to 2, with 0 denoting that a country did not experience any major internal

⁷ ILO estimates on female labor force participation do not start until 1991, leading to missing data for early ratifiers. However, the results below are unchanged whether or not this covariate is included in the matching method.

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, Early, and Peksen 2018).

In addition to differences in political and economic covariates, ratifying countries can have vast differences in both their respect for women's rights, as well as the robustness of their civil societies. To account for this, I incorporate measures on women's rights and the strength of civil society into the matching process using the Women's Civil Liberties (WCL) index and the Civil Society Index from the Varieties of Democracy (VDEM) dataset (Coppedge et al. 2020). Additionally, I use an indicator measuring women's access to credit from the World Bank's Women, Business, and the Law (WBL) index (World Bank 2022b). The WCL index from VDEM asks whether women have the ability to make meaningful decisions in key areas of their lives, such as freedom of domestic movement, freedom from forced labor, property rights, and access to justice (Coppedge et al. 2020), with scores ranging on an interval from 0 (low) to 1 (high). VDEM's Civil Society Index measures the robustness of a country's civil society and is measured on an interval scale similar to the WCL index. The credit access variable from the WBL index is a binary indicator measuring if discrimination by creditors legally prohibited based on gender.

Lastly, a potentially confounding scenario may occur if countries are ratifying multiple human rights treaties at once, making isolating CEDAW's effect on the informal economy hard to ascertain. Although a limited amount of treaty bundling is occurring in the sample, to address this possibility, I created a binary variable that takes the value of one (1) for countries that ratified CEDAW and any other major human rights treaty at the same time and zero (0) otherwise. From

there, I incorporated the bundling variable into the matching method to control for any confounding relationships.⁸

Identification Strategy

Previous research has shown that estimating outcomes for countries who ratify international treaties compared to countries who never ratify can lead to biased results, given domestic level characteristics can influence a state's decision to ratify (Hill 2010). Fortunately, the matching and difference-in-differences method utilized here sidesteps many of the econometric problems inherent in previous approaches while also improving the validity of causal inference by reducing model dependence. To estimate the ATT, I utilized Covariate Balancing Propensity Score Weighting (CBPS) to match treated and control countries based on treatment, outcome, and covariate histories three years prior to treatment onset. To illustrate the matching process, imagine country_i ratifies CEDAW in 1990. Given the pre-treatment lag specification of three years, country_i would match with control units that shared identical treatment history (i.e., had not ratified CEDAW) in the three years preceding ratification (1987, 1988, and 1989).⁹ The matching process resulted in 122 successful matches with an average matched set size of around 46 control units per treated unit, with weights determined via the CBPS algorithm.

⁸ In particular, 30 countries were found to have bundled CEDAW with another popular human rights treaty in the same year. The list of treaties that could be bundled with CEDAW include CAT, CERD, CMW, CRC, CRPD, ICCPR, and ICESCR.

⁹ For an in-depth explanation of the `PanelMatch` matching process, see (Imai, Kim, and Wang 2021)

After matching, I performed a difference-in-differences analysis¹⁰ on treated and control countries to test CEDAW's effect on the size of the informal economy, generating standard errors via block bootstrapping with 10,000 iterations.¹¹ In a difference-in-differences analysis wherein 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 (Wooldridge 2007). Moreover, this process removes biases between treatment and control groups due to both differences between the groups as well as over time biases resulting from different trends.¹²

The Parallel Trends Assumption

An important step to obtain causal identification in a difference-in-differences analysis is satisfying 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 sequential ignorability. However, causal inference under the parallel-trends assumption argues that after conditioning on treatment, outcome, and covariate

¹⁰ I performed the analyses via the R package `PanelMatch` developed by Imai et al. (2021).

¹¹ Matching on confounding covariates and a lagged dependent variable helps address endogeneity concerns. Additionally, utilizing block bootstrapping addresses concerns surrounding autocorrelation.

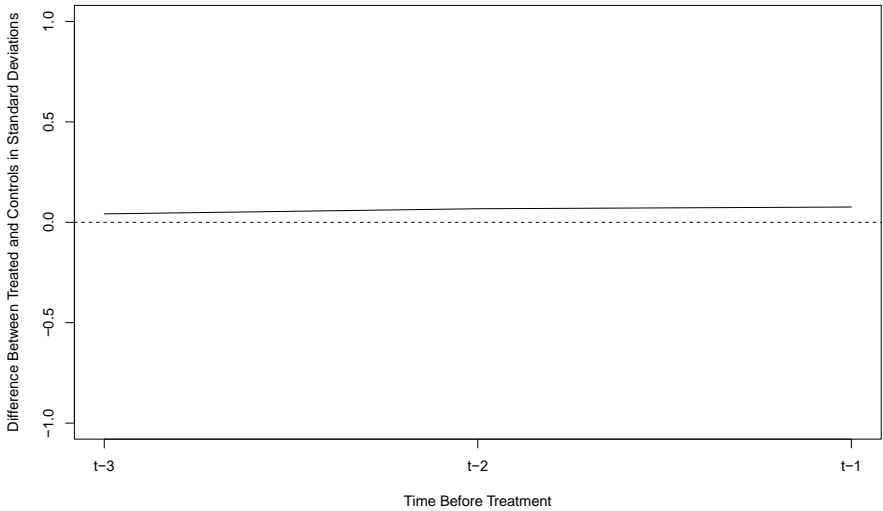
¹² Previous research by Goodman-Bacon (2021) and others have pointed out issues that can occur with weights in a staggered treatment difference-in-differences analyses. However, the `PanelMatch` package by Imai et al. (2021) takes this into consideration with the flexible weighting estimator and matching on covariates.

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 we can visually examine whether trends between groups appear to be parallel in the pre-treatment period, as shown in Figure 1 below. The standardized mean distance of 0.07 for the dependent variable is both small and fairly constant over time, adding confidence that the parallel trends assumption holds (Imai, Kim, and Wang 2021). While missing confounders in TSCS data is always a possibility, if we accept the parallel trends assumption, and observe that trends in the outcome variable of interest are indeed parallel between treated and control groups, then unobserved confounders should not be a threat to causal identification.

Figure 1

Parallel Trends Plot Showing Minimal Difference Between Treated and Control Groups



Note: The x-axis shows the time (in years) before a country ratifies CEDAW, 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. The standardized mean distance of 0.08 is both small and relatively constant over time.

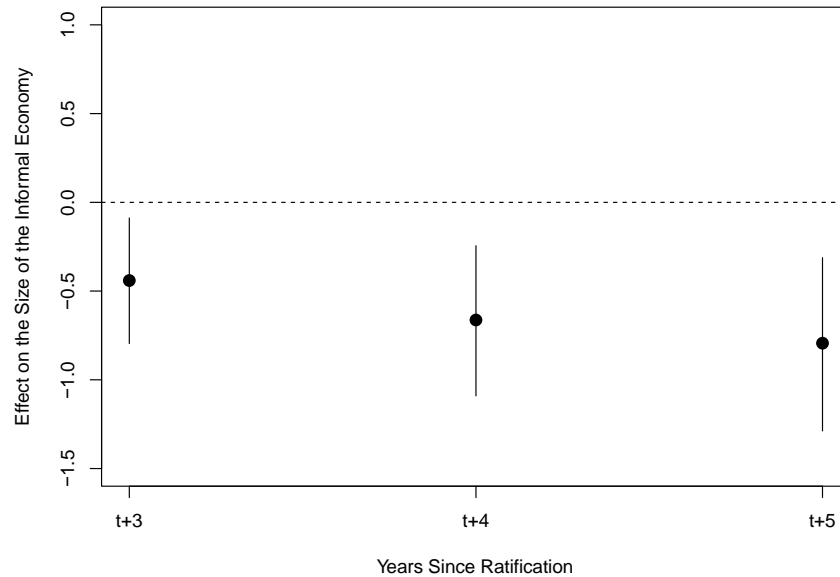
Results

What effect, if any, does CEDAW have on the informal economy? As a reminder, I argue that CEDAW plays a meaningful role in eliminating barriers to formal employment for women. Once these barriers are eliminated, women face fewer constraints to formal employment, resulting in an overall decrease in informality. Figure 2 shows that for those countries who ratify CEDAW, there is a significant reduction in the size of the informal economy compared to control countries, giving support to Hypothesis 1. These estimates are the difference between treated countries minus their matched control countries, giving us a reasonable counterfactual comparison of CEDAW's effect on informality. Starting at three years after ratification, CEDAW accounts for a decrease in the size of the informal economy by just under a half of a percentage point and continues to play a role in shrinking the informal economy until at least five years after ratification.¹³

Figure 2

Estimated Effect of CEDAW Ratification on Informal Economic Activity Over Time

¹³ Specifically, CEDAW ratification is estimated to reduce the size of the informal economy by 0.44 percentage points, significant at the .05 level.



Note: The y-axis shows the percentage point change CEDAW ratification has on the size of the informal economy while the x-axis shows the time (in years) after a country ratified CEDAW, starting in the third year after ratification. Point estimates with 95% confidence intervals are generated by comparing the average difference-in-differences for ratifying countries to their matched control units and block bootstrapping standard errors with 10,000 iterations.

For a substantive illustration, let's return to our example of Nepal from earlier. According to the World Bank's World Development Indicators (World Bank 2022c), Nepal's informal economy was estimated to be 44.67% of 3.9 billion in GDP (current US\$) in 1991, the year Nepal ratified CEDAW. In the three years after ratification, Nepal's economy ebbed and flowed, eventually growing to over 4 billion in GDP (current US\$) in 1994, yet the size of the informal economy decreased by 1.77 percentage points to 42.9% of GDP. Although this may seem like a modest reduction at first glance, compared to the counterfactual scenario in which Nepal does not experience a decrease, this reduction equates to just over \$72 million in additional taxable revenue for the Nepalese people.¹⁴ A sizeable sum for a country in which the GDP per capita in 1994 was \$186.6 USD (World Bank 2022c).

¹⁴ Author's own calculations.

Nepal's modest reduction could plausibly be attributed to the scenario mentioned above – many in the judiciary were unaware of CEDAW's provisions and failed to enforce their obligations immediately. However, we do see sizable decreases in the informal economy in many other developing countries throughout the world shortly after ratification. For example, looking at the same period from 1978 to 2012, the average informal economy size for countries in sub-Saharan Africa stands at 41.39% of GDP, while in Latin America and the Caribbean the average is 42.26% of GDP. Many of the developing countries in these regions started out with larger informal economies compared to some of their wealthier counterparts. However, we also see comparably larger reductions in the informal sector in the three years after CEDAW ratification. For example, when looking at OECD member countries,¹⁵ the largest reduction in informality three years after ratification occurred in Portugal, which saw a decrease of nearly 1.5% of GDP. While this is undoubtedly a large decrease, especially for an OECD country, it is less than half the size of the decrease experienced by Mozambique (3.81%) and the Republic of Congo (3.75%). Similar outcomes can be found in Latin America and the Caribbean, where countries such as Nicaragua and Haiti experienced decreases in the size of their informal economies of 2.72% and 2.71%, respectively.

As I argued above, while most countries are ratifying CEDAW for a number of reasons including reforms to penal and family laws, the potential effects on informal employment are more than likely not a core issue driving ratification decisions. Given the continued challenges that many countries face to this day, seeing a meaningful effect on the size of the informal

¹⁵ In the sample, OECD countries were considered as those members belonging to the organization prior to the United Nation's General Assembly's adoption of CEDAW in 1979.

economy within the first few years after ratification is a testament to the important, yet often overlooked, peripheral outcomes around international treaties. Recognizing the downstream consequences of treaties like CEDAW furthers our understanding of the role international agreements have on domestic outcomes and offers evidence for one way through which CEDAW improves women's economic situation. Additionally, in the appendix I provide evidence of CEDAW's role on improving a broader range of women's economic outcomes. Utilizing CIRIGHTS data, I show that CEDAW ratification increases the probability of a country moving from having little to no laws or enforcement for women's economic rights, to having both formal laws guaranteeing women's economic rights and effective enforcement of these laws.¹⁶

Testing the Mechanism

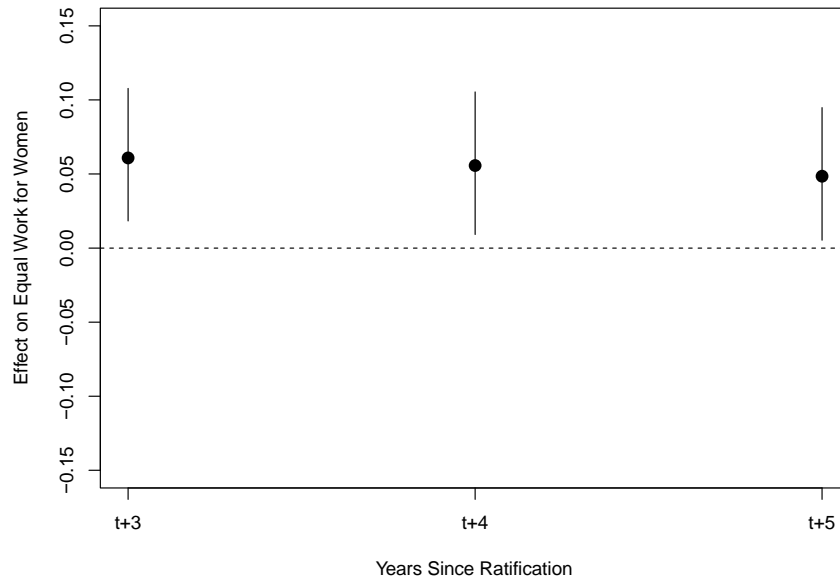
The above results give support to my argument that CEDAW plays a meaningful role in reducing the size of the informal economy. Although there are arguably multiple channels through which CEDAW affects informality, I argue one important mechanism is the elimination of legal barriers to women's formal employment. Specifically, I hypothesize that CEDAW ratification leads to an increase in the rate of women allowed to seek formal employment on an equal basis with men. To test this, I performed an additional matching and difference-in-differences analysis testing CEDAW's effect on formal barriers on women's equal employment. Figure 3 shows countries that ratified CEDAW experienced a six percentage point increase in women's legal

¹⁶ In the analysis for CIRIGHTS, CEDAW ratification resulted in a 10 percentage point increase in the probability that a country will move from the lower categories of 0 or 1 to the higher categories of 2 or 3 for women's economic rights.

capacity to work. This result offers support for Hypothesis 2 and gives evidence of one important mechanism through which CEDAW works to reduce informal employment.

Figure 3

CEDAW's Effect on Women Obtaining a Job on an Equal Basis with Men



Note: The y-axis shows the percentage point in women able to seek employment on an equal basis with men, while the x-axis shows the time (in years) after a country ratified CEDAW, starting in the third year after ratification. Point estimates with 95% confidence intervals are generated by comparing the average difference-in-differences for ratifying countries to their matched control units and block bootstrapping standard errors with 10,000 iterations.

CEDAW's Heterogeneous Effects

To test Hypotheses 3-5, I created dummy variables to perform subgroup analyses regarding a country's reliance on oil, the size of a country's export oriented manufacturing sector, or prior levels of gender inclusion. The matching and weighting procedure mirrored the main analysis while incorporating dummy variables as moderators into the difference-in-differences. As a reminder, Hypotheses 3a and 3b state that ratification will result in a significant reduction in the size of the informal economy for countries not dependent on oil, while having a diminished effect on the subset of countries who are dependent on oil. To test this, I created a dummy variable indicating oil dependent countries taken from the World Bank's WDI database. This variable takes

a value of 1 if a country's oil rents (% of GDP) are half a standard deviation above the sample mean, and a value of 0 otherwise.

Hypotheses 4a and 4b state that ratification will result in a significant reduction in the size of the informal economy for countries that have large export-oriented manufacturing sectors, and a reduced effect, if any, on countries with small export-oriented manufacturing sectors. To test CEDAW's effect on these subgroups of countries, I created a dummy variable for countries with large manufacturing exports taken from the World Bank's WDI database. This variable takes a value of 1 if a country's manufacturing exports (as a share of total merchandise exports minus agricultural exports) are half a standard deviation above the sample mean, and 0 otherwise.

Lastly, I created a dummy variable for countries based on their pre-ratification levels of gender inclusion, gathered from the VDEM dataset. As a reminder, Hypotheses 5a and 5b argues that we should expect CEDAW ratification to have heterogeneous effects depending on how much room-for-improvement a country has. For those countries with previously high levels of gender inclusion, CEDAW ratification should have a minimal impact, if any, on the size of the informal economy. This is due to the fact that many of the barriers that are meant to prevent women from formal employment have already been remedied. In other words, we should expect "ceiling effects" to occur. Conversely, the subset of countries that previously excluded women have ample room-for-improvement and should see a decrease in the size of the informal economy after ratification as these previously high barriers are eliminated. Gender inclusion 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). The variable is formed via multiple 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). The gender inclusion dummy variable takes a value of 1 if a country's pre-ratification gender inclusion score is half a standard deviation about the sample mean, and 0 otherwise.¹⁷

Table 1 below offers support for CEDAW's heterogenous effects on the size of the informal economy. For those countries not dependent on oil, the decrease in informality is both significant and larger than the global sample, with an estimated decrease in the size of the informal economy by 0.53 percentage points. However, for the subset of countries highly dependent on oil rents, the coefficient is much smaller in magnitude and not precisely estimated. Taken together, the results for Hypotheses 3a and 3b suggests that a country's economic orientation may dampen the effects CEDAW has on moving women out of the informal economy. In other words, while CEDAW addresses many legal obstacles towards women working formally, there may be other economic factors at work which CEDAW is unable to remedy.

Continuing with Table 1, results show CEDAW ratification's heterogenous effects for countries with large versus medium-to-small manufacturing industries. Ratification results in a negative but insignificant effect on the size of the informal economy for the subset of countries with small export-oriented manufacturing sectors. In contrast, for those countries with large export-oriented manufacturing sectors, ratification results in a significant reduction in the size of the informal economy. In fact, these countries see the largest decline in informality in the sample, with a decrease of nearly 1 percentage points. These results align with my argument that once CEDAW helps to eliminate formal barriers to work, countries with large export-oriented manufacturing sectors are able to tap into previously unavailable labor pools, or formalize

¹⁷ As opposed to VDEM's original coding, gender inclusion is coded so that higher values represent more inclusion rather than exclusion.

previously informal working women, resulting in an overall reduction in the size of the informal economy.

Lastly, Table 1 shows support for both Hypotheses 5a and 5b regarding a country’s “room-for-improvement”. CEDAW ratification results in a negative effect on the size of the informal economy for prior inclusive countries, however the estimate is imprecise and not significant at conventional levels. However, for those countries that were more exclusive towards women prior to CEDAW, ratification results in a significant decrease in the size of the informal economy, with an estimated decrease of half a percentage point, significant at the .05 level.

Table 1.

Estimated Effect of CEDAW Ratification on the Size of the Informal Economy

| Sample | Estimate | Std. Error | 95% Conf. Intervals |
|-----------------------------|----------|------------|---------------------|
| Global Estimate | -0.44* | 0.18 | [-0.80 , -0.08] |
| Oil Dependence (High) | 0.09 | 0.71 | [-1.35 , 1.45] |
| Oil Dependence (Low) | -0.53** | 0.19 | [-0.91 , -0.18] |
| Export Manufacturing (High) | -0.97** | 0.36 | [-1.73 , -0.31] |
| Export Manufacturing (Low) | -0.12 | 0.29 | [-0.68 , 0.46] |
| Prior Inclusive Countries | -0.29 | 0.27 | [-0.82 , 0.24] |
| Prior Exclusive Countries | -0.50* | 0.22 | [-0.94 , -0.08] |

Note: Estimates are the difference-in-differences between treated and matched controls three years after CEDAW ratification. Standard errors are generated via bootstrapping with 10,000 iterations: † p<0.10 * p<0.05 ** p<0.01

In summary, the results above offer supporting evidence for Hypotheses 1 through 5. CEDAW ratification results in a reduction in the size of the informal economy on a global sample, however there are heterogeneous effects depending on a country’s reliance on oil rents, size of export-oriented manufacturing industries, and prior levels of exclusion towards women. Additionally, I find support for my proposed mechanism that CEDAW’s effect on the informal economy works by eliminating legal barriers to formal work for women.

One caveat to this study is the lack of data for the time period of the sample on informal economic activity by gender.¹⁸ However, I contend that the results are consistent with my argument for two 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 might be doing so not because of reasons in the “exclusion channel”, but rather reasons related to the “exit channel”, such as avoiding high tax burdens or market regulations. Secondly, I both theorize and show where heterogeneous effects of ratification should exist. Factors such as different economic orientations brought on by oil dependence, the size of a country’s export-oriented manufacturing industries, as well as a country’s previous levels of exclusion towards women result in varying degrees to which CEDAW impacts the informal economy. Given these heterogeneous effects, it is difficult to explain the variation we see in informal economic activity if ratification has no effect on women moving out of the informal economy as I propose here.

Robustness Checks

While the analyses above offer evidence that CEDAW ratification plays an important role in lowering informal economic activity, it is prudent to test the robustness of the results due to threats to inference. In the appendix, I show that the results above hold under different lag and lead

¹⁸ Country-level estimates on informal employment by gender from reputable organizations such as the ILO and OECD are not only scarce, but suffer from a lack of historical data, with estimates starting in the mid-2000s, well after most countries had ratified CEDAW.

lengths¹⁹, as well as alternative matching methods such as propensity score weighting and Mahalanobis distance matching. Additionally, I conduct multiple analyses to address endogeneity concerns, such as whether high levels of informality or high levels of gender inclusion lead to CEDAW ratification. The results for both endogeneity tests are insignificant, giving greater confidence in the findings above and alleviating potential concerns that high levels of informality or countries with gender inclusion are driving decisions to ratify CEDAW.²⁰ Moreover, I also show in the appendix an additional analysis adding the heterogeneous treatment variables from above into the matching process. Although slightly smaller in magnitude, the results show CEDAW accounts for a decrease in the size of the informal economy by roughly 0.38 percentage points, significant at the .05 level. Lastly, I show in the appendix an analysis testing whether CEDAW's effect on informal economies is being driven by those countries who are bundling multiple human rights treaties at the same time. Estimates show that CEDAW ratification has an insignificant effect on the size of the informal economy for this subset of countries, alleviating concerns that the results found above are being driven but a small subset of reform-minded countries.

Placebo Test

One potential threat to inference is the chance that a reduction in the informal economy is due to signing any human rights 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 popular human rights treaties may act as a signaling device to the international

¹⁹ One exception occurs with inclusive countries, which see a decrease in the size of the informal economy five years after ratification.

²⁰ Additionally, both gender inclusion and previous levels of informality are controlled for in the matching procedure in the global, subsample, and mechanism analyses.

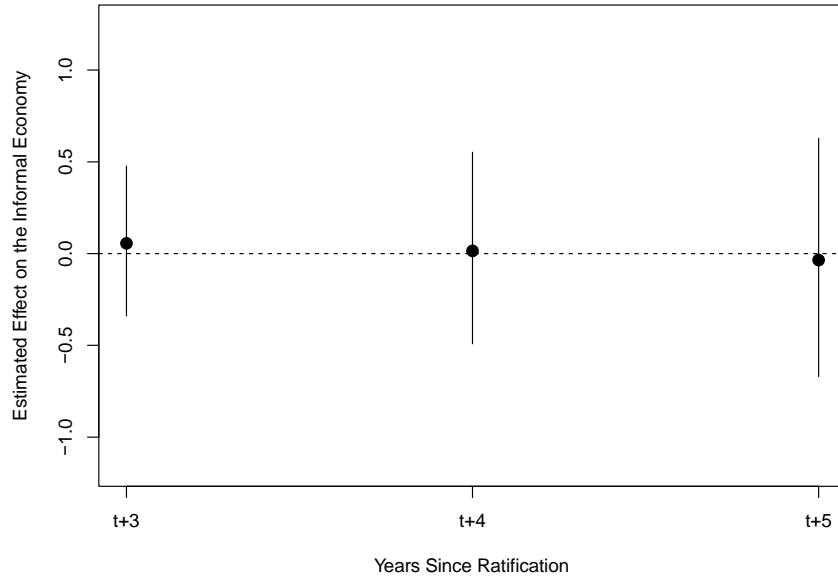
community. The logic here rests on the idea that by ratifying popular treaties, countries signal to potential investors that they are a good place to do business in. Once a country sends out this signal, different forms of investment or development aid enter into the country and create new economic opportunities, resulting in a decrease in the informal economy.

To investigate whether ratifying any international human rights treaty causes a reduction in the informal economy, rather than CEDAW specifically, I performed a placebo test using ratification data for the Convention Against Torture (CAT). Specifically, I matched countries on the same covariates as the main analysis using CBPS weighting²¹ and a three-year lag while replacing the CEDAW treatment variable with an indicator for CAT ratification taken from Ryckman (2016). Figure 4 below shows the estimated effect of CAT ratification on the size of the informal economy is statistically indistinguishable from zero. This is exactly what we would expect to see given a placebo test of this nature. CEDAW and CAT send out entirely different signals to both domestic and international audiences, and we should not expect one to have the same effect as the other, especially on the size of the informal economy. These results offer further evidence to my argument that it is CEDAW ratification specifically, rather than ratification of any human rights treaty, that is causing the reduction we see in the size of the informal economy.

²¹ A parallel trends plot for the CAT analysis can be found in the Appendix.

Figure 4.

Estimated Effect of Ratification of the Convention Against Torture on Informal Economic Activity



Note: The y-axis shows the percentage point change CAT ratification has on the size of the informal economy while the x-axis shows the time (in years) after a country ratified CAT. Point estimates with 95% confidence intervals are generated by comparing the average difference-in-differences of ratifying countries to their matched control units and block bootstrapping standard errors with 10,000 iterations.

Conclusion

What effects international treaties have on domestic outcomes has, and will continue to be, a hotly debated topic. Yet, regardless of where one falls in this debate, these treaties often have downstream effects that are peripheral to ratification concerns. In this paper I show how a seemingly political treaty aimed at improving women’s lives, CEDAW, helps to reduce the size of the informal economy for ratifying countries. Utilizing matching and difference-in-differences for TSCS data, I show that ratification results in a significant reduction in the size of the informal economy by nearly half a percentage point. Furthermore, I offer evidence of one potential mechanism through which CEDAW works – the reduction of legal barriers to employment for women.

Reducing informality results in additional tax revenue that can help fund often needed public goods provision in addition to normatively desirable outcomes such as less dangerous work and lower rates of poverty and inequality. Although Nepal's hurdles were used as an illustrative example above, the issues experienced are similar for many countries. For example, between 2004 – 2010, up to 95 percent of women workers in Southern Asia were employed informally (UN Women 2015). In Sub-Saharan Africa, these shares have been reported to reach up to 94 percent (Malta et al. 2021). Given the disproportionate number of women working informally on a global scale, understanding the determinants of informal work is critical to achieve sustainable development and equitable inclusion.

Additionally, I show the heterogeneous effects CEDAW has on women's informal employment due to factors such as reliance on oil rents, manufacturing exports, and prior levels of inclusivity. Ratification was shown to decrease the size of the informal economy in countries with low oil dependence, countries with a large export manufacturing sector, and in countries with high levels of exclusion towards women prior to ratification.

Future work could test the downstream effects of other international treaties, as well as other mechanisms through which CEDAW affects economic outcomes. Previous work has argued that formal laws can change local customs in favor of marginalized groups (Aldashev et al. 2012). When international agreements such as CEDAW result in equitable changes to domestic laws, local attitudes and customs towards women may also change for the better. In addition to formal legal barriers, these changes in customs may lower societal or cultural barriers to equality that women face on a daily basis.

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