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OIL AND GENDER RELATIONS: A CLOSER LOOK AT THE LABOR MARKET

by
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AN ABSTRACT OF THE THESIS OF

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This paper aims at examining the effect of oil wealth on the ratio of female to male labor force participation rate as a measure of gender disparity in the labor market. There has been an ample amount of literature that investigates the resource curse in economic and political contexts. This study, following a few recent ones like that of Ross (2008), extends the literature to a social spectrum and investigates the relation between oil wealth and gender issues, specifically in the labor market. Using a country fixed-effects panel approach on a sample of 176 countries over the period 1990-2017, the results show that oil revenues have a negative effect on the outcome of interest. In particular, a 100 barrels per capita increase in oil production decreases the ratio of female to male labor force participation rate by 6-7%. This result is highly statistically significant and is robust to alternative specifications and a variety of measures of the variables of interest.

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CHAPTER I

INTRODUCTION

A. Gender issues: Women empowerment

A gender gap persists globally today, although its size differs across countries. For example, Germany has a gender inequality index of 0.066, in comparison to 0.767 for Yemen year 2015 (UNDP, 2016).[1] The status of women, their empowerment, access to educational and health services, participation in the labor market and political participation vary across countries, and this variation could be attributed to several factors, such as religion, culture (Inglehart et al, 2002), economic growth and development (Duflo, 2012), among others.

Women have made significant progress in education at all levels, even in tertiary education. For example, women's enrolment in tertiary education has exceeded that of men even in countries like Afghanistan (since 1986), Angola (years 2002, 2011, 2013), and Bangladesh (starting 1980) (World development indicators).

Despite this progress, women still seem to lag behind men in several aspects, especially in the labor market and in politics.

According to Kabeer (2005), access to paid work and political representation seem to have the most significant effects on women in society. Being part of the labor force strengthens

[1] The gender inequality index (GII) is constructed by UNDP using reproductive health, empowerment, and the labor force participation rate to measure the loss of achievement due to gender inequality in the country.

women's abilities in decision-making, even beyond the household level. It has also proved to reduce violence against women, and to contribute positively to their self-esteem in society. As a result, they could negotiate their demands better individually or collectively (Kabeer, 2005).

Engaging in an economic activity allows women to achieve independence in decision-making, including decisions regarding marriage and having children. Through employment, women also interact with other members of society which allows them to have a better sense of their rights and what they could achieve, and even participate in the political decision-making process through voting (Kabeer, 2005).

B. Women status and oil

In a literature review on the relation between women's empowerment and economic growth and development, Duflo (2012) presents research arguing that economic growth affects women's empowerment positively through reducing poverty and providing more opportunities. However, does the effect of this growth differ with the type of growth?

Michael Ross (2008) suggests that economic growth that is based on oil production affects gender relations differently. Ross is the first to investigate the effect of this sector on women's status in oil producing countries, following the literature that attributes these gender related issues to culture and religion. His study also examines gender inequity as another possible manifestation of the "resource curse".

Oil and gas production has long been considered as affecting economic outcomes such as growth and development, as well as political outcomes ranging from institutional quality to corruption, rent seeking and violence. Ross (2008) takes a more holistic view of the resource curse, adding to the literature by investigating some of the possible social outcomes of oil production, namely the participation of women in the labor force and in political life.

One of the channels through which oil could affect the labor force participation of women according to Ross (2008) is the Dutch Disease. As explained later in the text, an oil boom can have a negative effect on non-oil traded goods sectors. The increased demand for local currency caused by oil sales leads to the appreciation of the currency, thus imported goods become relatively cheaper than local goods, causing the demand for locally produced tradable goods to decrease. Also, the demand for non-traded goods such as construction and services increases because locals are now wealthier (Ross, 2008).

In such a Dutch Disease model, we are assuming that an oil boom causes deterioration in the traded goods sector, while it reflects positively on the non-traded goods sector. How does this relate to women? Another assumption held by Ross (2008) is that female labor is demanded in the traded goods sector, things like export-oriented industries such as garments and textiles.

If this is the case, then an oil boom will cause a decrease in the demand for female labor, as the economy will shift to the non-traded goods sector which demands males instead. However, if females are not constrained from working in the non-traded sector, then the result would be different.

We can also think of the supply side of the equation. Women's supply of labor is affected by "unearned income" as introduced by Ross (2008). He uses this term to refer to a woman's family's income, i.e. income acquired by the household, not directly by her. Oil booms increase the family's income, making the "reservation wage", which is the wage at which she is willing to supply labor, higher. We can put this in a simpler way: if her family is richer, a woman has no incentive to join the labor force for a low wage because she does not need to.

Briefly, an oil boom causes the demand of female labor to decrease because of the deterioration in sectors that demand women, and it decreases the supply of female labor because of higher unearned income. As a result, women labor force participation rates decrease as oil production increases. This is true only if Ross's previously mentioned assumptions hold.

The effect of an oil boom becomes unclear if these assumptions are challenged. For example, the demand of female labor might be affected differently if women are free to work in the non-tradable sectors. Interestingly, Ross's empirical analysis confirms a negative correlation between oil income and women labor force participation rates.

Following Ross (2008), I am interested in investigating the effect of oil production on women's status in the world. My focus is on discrepancies in the labor market by taking the ratio of female to male labor force participation rates, as opposed to simply looking at the absolute female labor force participation as the literature has done. The reason is that the arguments put forward by Ross in positing possible labor market effects of an oil boom could be just as valid when it comes to demand and supply of labor by men. Instead, I am interested in investigating any skew in the effect natural resources may have on labor force participation rates of one vs. the other gender. The main question that will be tackled is: how does an increase in oil wealth affect women's participation in the labor market relative to men's?

That being said, I decided to use the ratio of female to male labor force participation rate as an indicator of gender equity.

I do realize the importance of political participation on women. Having women in parliament or in government reflects positively on their status in the society, as they could pass their demands and negotiate them at a higher realm.

However, political participation could be viewed as a consequence of labor force participation. As Ross (2008) indicated, women participating in economic activities are exposed to a wider spectrum that allows them to define their perceptions and identities. It also allows them to form associations and networks, and most importantly, it pressures the government to take their demands into account as they have an increased role in the economy (Ross, 2008).

Moreover, data on political participation, which is measured by the proportion of parliamentary seats or ministerial positions held by women is limited to very recent years and is often missing for many countries. Thus, I will consider labor force participation rate alone as my outcome of interest.

Using a fixed-effects panel data approach on 176 countries over the period 1990-2017, my results are consistent with Ross's findings, as I find a negative statistically significant effect of oil income on the ratio of female to male labor participation.

This research adds to the relatively recent literature on the social dimension of the resource curse, following Ross's research. It provides as an extension to Ross's paper on oil and women by first, using a measure of gender inequity instead of just the female labor force participation rate in order to capture discrepancies in the labor market. Second, I also extend the dataset to include more recent years. This matters especially because by including later data, I hope I will be able to capture the effect of oil production on these social outcomes after the recent severe fluctuations in oil revenues.

It is important to note that this paper only investigates the existence of a relationship between the oil sector and the labor force participation of women vs men. It does not look into possible mechanisms that can explain the existence of such an effect. While the literature posits some possible mechanisms to explain the results (such as the Dutch Disease hypothesis developed by Ross (2008)), this investigation will not allow us to choose between possible mechanisms.

My paper continues as follows: chapter 2 offers a history of the resource curse hypothesis in the modern economics literature. Chapter 3 presents an overview of the empirical work done on the resource curse. Chapters 4 and 5 include a discussion of the data and the empirical strategy used in this paper. I discuss the results and the implications in chapter 6, perform some robustness checks in chapter 7 and then conclude.

CHAPTER II

HISTORICAL BACKGROUND AND CAUSAL MECHANISMS

A. A History of the resource curse hypothesis in the modern economics literature

In the 1950s and 1960s, resource wealth was perceived to be advantageous for developing countries: revenues generated could be invested in human development and infrastructure, thus promoting economic growth (Viner 1952, Lewis 1955, Spengler 1960). Optimistic researchers before the 1980s such as Rostow (1961) suggested that revenues accrued from natural resources could be employed in developing new markets and promoting investment and industrialization. This view is in line with Adam Smith and David Ricardo's beliefs that countries could use these revenues as a key tool to meet sustainable economic growth levels achieved in developed countries (Badeeb et al., 2016).

However, this was not the case. Divergent political and economic outcomes have been observed among countries, and special attention has been attributed to the role of natural resource wealth in contributing to these outcomes. For instance, a 45 percent decrease in per capita income has been observed in Gabon, which is the fifth largest oil producer in Africa, from 1980 to 2006 (Ross, 2012). Other oil producing countries have suffered from long periods of civil war like Algeria, Sudan and Iraq (Ross, 2012). On the other hand, countries like the United States and Canada, also oil producers and exporters, haven't been vulnerable to such problems. They have succeeded in achieving high levels of development and healthy institutions.

These rather unexpected outcomes have attracted the attention of researchers, who later theoretically and empirically investigated the resource curse hypothesis, a term introduced by Auty in 1993.

The optimistic view referred to by Smith and Ricardo persisted until the 1980s, after which the Dutch Disease (explained later) appeared, giving floor to the pessimistic view, known as the "resource curse" (Badeeb et al, 2016).

Below is a summary of the definition, origin, and causal mechanisms of the resource curse hypothesis, as represented by Badeeb et al (2016).

Alan Gelb (1988) was the first to investigate the effect of oil revenues on developing countries in his book: Oil Windfalls- Blessing or Curse. Focusing on six oil-exporting countries, Gelb argues that oil revenues should be accompanied by high institutional quality and proper economic policies in order to promote economic development, the reason why some resource-rich countries performed worse than their non-rich counterparts during the boom period of 1971-1983.

Following Gelb, Auty (1993) introduced the term "resource curse", in reference to the adverse effects of natural resource windfalls on economic growth. He notes that resource-rich countries "might fail to benefit from a resource endowment, and might as well perform worse than less well-endowed countries" (Auty, 1993).

B. Mechanisms linking resource wealth to economic growth

In understanding the relationship between natural resources and economic growth, two sets of links have been posited. Some of them are political, while others are economic.

Starting with the economic factors, researchers referred to Dutch disease, the volatile nature of resource prices, and failing economic policies. Each will be briefly discussed below.

The term Dutch disease first appeared in 1977 referring to the deterioration of the Dutch manufacturing sector following the discovery of natural gas in The Netherlands. As a result of this discovery, domestic income and spending increased, raising the demand of goods. This led to inflation and an appreciation of the domestic currency, making domestic non-resource goods less competitive on the international market as they became relatively more expensive. Moreover, the price of inputs (labor and capital) increased domestically, which in turn increased the production costs in non-resource sectors such as manufacturing and agriculture, leading to their decline (Badeeb et al, 2016).

Another mechanism put forward in the literature to explain the resource curse is that the prices of these commodities, for example oil prices, are extremely volatile. The price volatility of these commodities causes instability in government revenues and increases uncertainty for investors, which affects economic development negatively (Davis and Tilton, 2005).

Finally, resource revenues may distort government incentives, resulting in a resource curse. This is also referred to as the "rentier state hypothesis" (Ross, 2001). Due to the easy access to resource revenues, governments will feel less pressured to collect taxes or even impose them. Since policymakers are less dependent on their people's money (acquired through imposing taxes), they could feel less pressured to perform efficient reforms, or even to impose policies that promote development and growth. Thus, governments might slack or ignore the need to invest in infrastructure, education, and social services, hampering economic development (Ross, 2007).

Studies by Gylfason et al (1999) as referred to by Badeeb et al. (2016) have also shown that resource wealth affects human capital development negatively because of the high levels of nonwage income on one hand, and because of the already low public expenditure on education on another.

On the other hand, rent seeking and corrupt institutions are the two main political connections between resource wealth and adverse outcomes. As Gylfason (2001) indicated, the political elite tend to acquire a large share of resource revenues for its own benefits instead of investing in infrastructure and development, which is one of the outcomes in the rentier state theory. On institutional quality and corruption, some like Hodler (2006) and Frankel (2012) argue that resource wealth has a negative effect on institutional quality, while others treat institutional quality as exogenous, whereby it determines whether a resource windfall reflects positively or negatively on economic outcomes. In line with the second view, Sarmidi et al (2014) assert that better institutional quality offsets the negative effects of resource rents on economic growth.

C. Natural resources: their properties; a special reference to oil

Why is resource wealth special? And why have these resources been given a different attention than other types of resources or commodities?

There are a lot of other natural assets such as water, land and forests that have not been treated as oil, gas and diamonds have for example. Several studies, such as Manzano and Rigobon (2001), have proven empirically that this curse only exists for fossil fuels.

In reality, the oil sector has some special characteristics that contribute to such adverse outcomes.

First, it is an extractive sector; it need not be produced. It is capital intensive and thus doesn't require a lot of labor and doesn't create employment (Karl, 2007).

Moreover, oil prices are volatile. They can score as low as 15$/barrel as in the 1970s, or as high as 108.42$/barrel in year 2008 (BP statistics, measured in 2016 dollars). The volatility of oil prices has a direct effect on government revenues in countries highly dependent on oil, which impacts government planning, its ability to finance its spending, and which also creates uncertainty for foreign investors.

Among all natural resources, oil has received the most attention, due to its global importance. According, to Tsui (2005), the market for oil is the biggest worldwide among all natural resource markets.

In my paper, my main focus will be on oil revenues although I do realize that other natural resources like natural gas and gold for example share similar characteristics (extractive, capital intensive, creating little employment…). The reason for that is the high importance of oil as indicated previously and the ease with which reliable data on oil production and reserves can be found.

CHAPTER III

LITERATURE REVIEW

To survey the literature of the natural resource curse hypothesis, I will rely heavily on Badeeb et al.'s working paper (2016) that summarizes the theoretical and empirical studies that have been done to investigate the existence of such a curse.

According to Badeeb et al (2016), Sachs and Warner (1995) were the first to empirically test the effect of resource dependence on economic growth. Using primary exports of resources (including agricultural, mineral, and energy exports) over GDP as a measure of resource dependence for several resource dependent countries over the period 1970-1989, they were able to establish a negative correlation between resource dependence and economic growth.

Following Sachs and Warner's work, Gylfason (2001), Mehlum et al. (2006) and Stijns (2006) studied the effect of natural resource wealth on human capital development. While Gylfason (2001) and Mehlum et al. (2006) agreed that resource dependence adversely affects development outcomes, Stijns (2006) found that resource wealth allows countries to invest in human capital, and thus has a positive effect instead.

In his study, Gylfason (2001) used a sample of 65 resource rich countries over the period 1980-1997. Using the share of natural capital in national wealth as a measure of resource dependence, Gylfason shows that there exists a negative relationship between natural resource wealth and three measures of human capital development, namely public expenditure on education, expected years of schooling for girls, and gross secondary-school enrolment. He refers to four possible channels through which natural resources affect these outcomes: Dutch-disease, rent seeking, over-confidence, and neglect of education.

Mehlum et al. (2006) employ a panel data analysis over a sample of 42 countries, and their data extends from 1965 to 1990. Their results show that the effect of resource abundance on economic growth depends upon the quality of the institutions of the country. Using the rule of law as a measure of institutional quality, they prove that the resource curse only exists in countries with bad institutional quality, while it disappears in the group of countries with better institutions.

Supporting Gylfason (2001) and Mehlum et al. (2006)'s findings, Nili and Rastad (2007) proved that a 29% fall in average per-capita income was observed for oil exporting countries over the period 1975-2000 compared to non-oil countries. They also showed that financial development in oil-exporting countries has been weaker than that in other countries, which in turn affects economic growth negatively and might also explain the weakness of the private sector of these countries.

A lot of criticism has emerged against the use of certain metrics to measure resource wealth. Using resource exports/GDP as a measure of resource dependence has been attacked for being endogenous to the outcomes of interest such as institutional quality and growth for instance (Brunnschweiler and Bulte, 2008).

Daniele (2011) addressed these criticisms by distinguishing between two measures of natural resources: resource dependence and resource abundance. The results of his study vary depending on the measure used. He found that resource dependence has a negative effect on human development, but resource abundance (holding dependence fixed) has a positive effect instead. He also emphasizes that results depend on particular aspects of the countries, such as political and institutional characteristics.

Additionally, Apergis and Payne (2014) examined the effect of oil abundance rather than dependence on the economic growth of several MENA countries over the period 1990-2013. Their results show that oil abundance has a varying effect on economic growth. Specifically, although oil abundance proved to have a negative effect in previous periods, it turned out to affect economic growth positively after 2003, which is regarded as a consequence of improved institutional quality and reforms that offset the adverse effects of oil on the economy.

On the other hand, Atkinson and Hamilton (2003), Dietz et al. (2007), and Boos and Holm-Müller (2013) had similar results when investigating the effect of natural resources on genuine savings[2]. All three studies used a measure of mineral dependence rather than mineral abundance, but they covered different timeframes and different countries. However, their results were consistent; natural resources have negative effects on genuine savings.

Most of the studies employed cross-country panel data, beginning as early as the 1970s. Other studies used time series, like Papyrakis and Gerlagh (2007) who studied the effect of natural resources on human capital and investment in the United States, between years 1986 and 2001, and they found that natural resource dependence affects these outcomes negatively.

Studies also extend to political causal mechanisms for the resource curse, including rent seeking, weak institutions, conflict and corruption. For example, Gylfason (2001) stated that in some countries, the powerful political elite aims at maximizing its benefits from natural resource revenues instead of investing in development and infrastructure projects. This trend seems to be

[2] Genuine savings are net savings adjusted to resource depletion

prevalent in countries with weak institutions, where corruption is widespread with no accountability. This suggests that good political systems avert the negative effects of resource wealth, prompting economic growth instead (Torvik, 2009).

Other research shows that resource revenues cause conflict and corruption, thus affecting institutional quality negatively. This is in line with the findings of Hodler (2006), Limi (2007), and Frankel (2012).

For example, Hodler (2006) constructed a theoretical framework in order to explain why natural resources are a blessing in some countries like Norway, but a curse in others like Nigeria. Using proxies for natural resources, fractionalization and property rights, Hodler shows empirically that natural resources lead to violence and rent seeking actions in countries that have more rivalling groups, i.e. in countries that are more fractionalized.

Additionally, Lei and Michaels (2014) use a sample of 193 countries over the period 1946 to 2008 in order to study the impact of giant oil discoveries on economic and political outcomes. Although oilfield discoveries tend to increase oil production and exports in per capita terms by more than 50%, they found that such discoveries would increase the occurrence of internal armed conflict by 5 to 8 percentage points, specifically in countries that encountered such types of conflict over the decade before the discovery.

Other studies find no evidence in support of the resource curse hypothesis. For example, Brunnschweiler and Bulte (2008), using data on 60 countries from five different regions, found that resource dependence doesn't have any significant effect on growth, whereas resource abundance has a positive effect on growth and institutional quality. As indicated above, the difference between both measures of oil wealth will be discussed in the Data section below.

Similarly, Cavalcanti et al. (2011) found that natural resources are a blessing rather than a curse. Using data for 53 oil exporting and importing countries for the period 1980-2006, they proved that oil has a positive effect on income levels and economic growth both in the short run and in the long run. This is in line with the findings of Alexeev and Conrad (2009), Boyce and Emery (2011), and James (2015).

Aside from the conventional political and economic outcomes of interest in previous studies, Michael Ross (2008) extended the scope of the literature to social outcomes.

In his study, Ross (2008) investigated the effect of oil rents on the participation of women in the labor force and in political decision making. He used a first-differences model with country fixed effects and employed time-series cross-sectional data for all countries during the years 1990 to 2002. His results show a negative correlation between oil income and female labor force participation rates especially in the Middle East and North Africa. Similar results appear when investigating the effect of oil income on female representation in parliament.

More recently, researchers have been concerned about other social outcomes, including freedom of the press, repression, and human rights violation.

For instance, Demeritt and Young (2013) constructed a theoretical framework in an attempt to understand how states rich in oil often tend to repress their citizens and violate their rights. To test the validity of their hypotheses empirically, they used the CIRI dataset[3], covering the period from 1977 to 1999 for 141 countries. Using a logit model, their results show a

[3] The Cingranelli–Richards (CIRI) Personal Integrity Rights index includes a set of rights that define repression, such as extrajudicial killing, torture, disappearance, and political imprisonment. The index ranges from 0 to 8, given that higher values indicate higher respect of government for human rights (Demeritt and Young, 2013).

statistically significant effect of oil rents on human rights violation and repression, i.e. higher oil rents increase the probability that the state violates its citizens' rights and represses them.

In addition, Egorovot et al (2009) constructed a theoretical framework to try to understand the relationship between oil endowment and media freedom. Using a panel data approach over the period 1993-2007, they prove that oil abundance affects media freedom negatively, especially in the case of non-democratic regimes.

In this paper, I build on this momentum, in an attempt to identify the relationship between oil wealth and gender disparities in the labor market, following Ross's work (2008).

CHAPTER IV

DATA

A. Independent variables

My independent variable is a measure of oil wealth. Previous researchers have distinguished between two measures of this wealth: oil abundance and oil dependence. For example, Sachs and Warner (1995) and Arezki and Van Der Ploeg (2011) used primary exports of agricultural, mineral and energy exports over GDP as a proxy for natural resource dependence. Similarly, Ross (2006) and Auty (2007) used rents from natural resources divided by GDP as a measure of dependence as well.

However, this measure was criticized later because when used to try to understand the resource curse, it suffers from endogeneity. For instance, Brunnschweiler and Bulte (2008) criticize Sachs and Warner's measure because the denominator of the proxy (which is GDP) is affected by several factors such as institutional qualities that might in turn affect both sides of the regression.

Thus, Brunnschweiler and Bulte (2008) proposed ways to deal with this problem. They introduced a measure of resource abundance, which could be measured by oil income per capita for example.

Following Brunnschweiler and Bulte (2008) and Ross (2008), I use oil income per capita as a measure of resource abundance. Data on oil production are retrieved from U.S. Energy

Information Administration. Oil production is measured by thousands of barrels per day. It includes the production of total petroleum and other liquids[4].

In the robustness checks section, I run regressions using oil reserves instead of oil production data. These are also retrieved from the U.S Energy Information Administration. Oil reserves include total petroleum and other liquid reserves including crude oil and lease condensate.

Other natural resources such as natural gas or diamonds might share very similar characteristics as oil, in the sense that they are capital-intensive extractive sectors, and create relatively few job opportunities. They might thus affect my outcome in a similar manner. However, the results presented here are confined to the oil sector, as a first investigation of any presence of an effect.

Data on annual population size is taken from the World Bank World Development Indicators. I divide yearly oil production by population size in order to get oil production per capita.

B. Dependent variable

My dependent variable is the ratio of female to male labor force participation rate (%). It is calculated by dividing female labor force participation rate with male labor force participation rate as estimated by the International Labor Organization (ILO). Labor force participation rate

[4] Production of petroleum and other liquids includes crude oil, NGPL and other liquids, and refined petroleum products like jet fuel, fuel oil, Kerosene…

includes the proportion of the population who are above 15 years old and who are economically active, i.e. they are employed or looking for a job.

Ratio of female to male labor force participation rate= $\frac{female\ labor\ force\ participation\ rate}{male\ labor\ force\ participation\ rate} \times 100$

This data is released by the World Bank as estimated by the ILO.

The following are control variables that might affect my outcome of interest:

- Log GDP: which is a measure of income (Ross, 2008); it is measured in constant 2010 dollars, and is obtained from the World Bank data.
- Exports: which measures the level of exports in constant 2010 dollars; it is also retrieved from World Bank data. This measure is used to control for export-oriented sectors that might have an effect on female participation in the labor force (Ross, 2008).
- Total Population: measures yearly population, and is obtained from World Bank data (Demeritt and Young, 2013).
- Civil liberties and political rights: Following Inglehart et al (2002), these are included as a measure of institutional quality in the country. Each has a score from 1 to 7, with 1 indicating the highest degree of freedom and seven the lowest. This data is obtained from the Freedom House.
- Conflict: it is a dummy variable that gives the value of 1 if there were at least 1 armed conflict for the country-year (Demeritt and Young, 2013). This data is retrieved from the Uppsala Conflict Data Program (UCDP)[5].

Refer to table 6 for summary statistics.

[5] I used the UCDP/PRIO Armed Conflict Dataset, Version 17.2.

CHAPTER V

EMPIRICAL STRATEGY

The aim of this research is to study the effect of oil wealth on discrepancies between women and men in the labor market. As indicated above, we will use the ratio of female to male labor force participation rate as a measure of disparity between the sexes. We start with a sample of 176 countries over 1990-2017 because data on the outcome of interest is only available starting 1990.

Taking 3-years averages of all the variables, I perform a simple OLS regression, with and without time lags, then use both a fixed-effect and a random-effect model with year fixed effects. Although taking the three-year averages reduces the sample size, it is important to prove that the estimations are not a result of idiosyncratic year-to-year variations in the variables. Moreover, to the extent that measurement error is independent across yearly observations of a variable, taking three-year averages reduces measurement error.

A. OLS regression using 3-year averages

First, I use a simple OLS regression using the three-year averages data. The equation is as follows:

$$LogRatio_{it(3\text{-year averages})} = \beta_1 \text{ oil income}_{it\ (3\text{-year averages})} + \beta_2 X_{it\ (3\text{-year averages})} + u_{it} \qquad (1)$$

Where

- $LogRatio_{it}$ is the logarithm of the ratio of female to male labor force participation rate (%)
- Oil $income_{it}$ is the independent variable, and is calculated as indicated in the data section.

- u_{it} is the error term
- β_1 is the coefficient of oil income, which will need to be estimated.
- X_{it} is a set of control variables including logGDP, Exports, population , institutional quality (CL, PR data from freedom house), and conflict

The same regression is estimated again, but allowing for a one period lag between independent variables and the outcome variable:

$$LogRatio_{it(3\text{-year averages})} = \beta_1 \text{ oil income}_{it-1(3\text{-year averages})} + \beta_2 X_{it-1(3\text{-year averages})} + u_{it-1} \qquad (2)$$

However, this specification still suffers from omitted variable bias: it does not control for unobservable factors that could affect the dependent variable and does not consider within country variations. So I estimate a random effects model, followed by country fixed effect estimation after performing a Hausman test.

B. Random Effects model using 3-year averages and year fixed effects

The equation becomes as follows:

$$LogRatio_{it} = \beta_1 \text{ oil income}_{it} + \beta_2 X_{it} + \alpha + \delta_t + u_{it} + \varepsilon_{it} \qquad (3)$$

Where:

- u_{it} is the between-country error
- ε_{it} is the within-country error
- δ_t is a set of dummy variables for years

C. Fixed Effects model using 3 year-averages

Using a Hausman-test (see appendix), I check for the correlation between the country-specific error terms and the regressor, in our case oil production per capita. The results show that they are correlated, and I choose to use a country fixed-effect rather than a random-effect model.

The country fixed-effect model is used to control for any unobserved time-invariant factors at the country level that might affect the results.

Our equation becomes as follows:

$$LogRatio_{it} = \beta_1 \text{ oil income}_{it} + \beta_2 X_{it} + \alpha_i + \delta_t + u_{it} \quad (4)$$

Where:

α_i is the unknown intercept for each country (i=1…176)

The same estimation is performed using a specification that allows for a period lag between the outcome variable (the ratio for female to male labor force participation rate) and the independent variables:

$$LogRatio_{it} = \beta_1 \text{ oil income}_{it-1} + \beta_2 X_{it-1} + \alpha_i + \delta_{t-1} + u_{it-1} \quad (5)$$

CHAPTER VI

RESULTS AND INTERPRETATION

A. Results

Table (1) presents the results of our main estimations. Column (1) shows the estimates of the OLS regression using the three-year averages of all our variables. The coefficient of oil production per capita has a negative sign as expected, and it is significant at the 10% level.. However, when performing the same OLS regression with lagged regressors, the coefficient of oil production becomes insignificant (column 2).

Regressions (1) and (2) are presented here for benchmarking, however, the error component structure and the panel nature of the data both suggest we should take into consideration country-level effects in the error term.

Using a random-effects model, oil income per capita becomes significant at the 5% level. The coefficient has the value of -0.00052 , which indicates that a 100 barrels increase in oil production per capita annually causes a 5.2% decrease in the ratio of female to male labor force participation rate (column 3 in table 1).

After running a Hausman test for any systematic variation in the coefficients of the consistent and the efficient estimators, we reject the null hypothesis and opt for including country-level fixed effects to control for unobservable factors. Column 4 in table 1 presents the results of this specification. Oil income per capita is again highly statistically significant, with a magnitude of -0. 00052. This indicates that a 100 barrels increase in oil production per capita decreases the ratio of female to male labor force participation rate by 5.2%, which is close to the result of equation (3).

Even when running the same regression with lagged regressors, the results don't change. Column (5) shows that the coefficient of oil production per capita is -0.00046, which means that a 100 barrels increase in oil production per capita this period causes a 4.6% decrease in the ratio of female to male labor force participation rate the next period.

Table 1: Results of the main specifications: using the three-year averages

	(1) OLS	**(2) OLS**	**(3) RE**	**(4) FE**	**(5)FE**
	$LogRatio_{it}$	$LogRatio_{i\,t}$	$LogRatio_{i\,t}$	$LogRatio_{i\,t}$	$LogRatio_{i\,t}$
		lagged regressors			
Oil production per capita	-0.0004865* [0.0002729]]	-0.000395 [0.0002717]	-0.0005219 ** [0.0002058]	-0.0005171 ** [0.0002141]	-0.0004613 ** [0.0002062]
Log GDP	-0.0421772 *** [0.0106456]	-0.0381864 *** [0.0101084]	0.0379599*** [0.0119239]	0.0479333 *** [0.0142478]	0.0435745 *** [0.0129935]
Exports	3.03e-13 *** [7.57e-14]	3.18e-13*** [7.40e-14]	-6.91e-15 [3.46e-14]	-1.11e-14 [3.44e-14]	-1.39e-14 [3.16e-14]
Population	-1.42e-10 ** [1.11e-10]]	-1.77e-10 [1.08e-10]	-4.70e-10 *** [1.40e-10]	-6.20e-10 *** [1.69e-10]	-6.25e-10 *** [1.47e-10]
Civil liberties	-0.1299549 *** [.0246649]	-0.1154509 *** [0.0238862]	0.0051187 [0.0080178]	0.0118059 [0.0078268]	0.0067702 [0.0071258]
Political rights	. 0511034 ** [0.0204418]	0.0420117 * 0.0198794]	-0.0038461 [0.0058791]	-0.0040319 [0.005689]	0.0002285 [0.005566]
Conflict	-0.2308348 *** [0.0442108]	-0.2450261 *** [0.0416045]	-0.0082115 [0.0157313]	0.000778 [0.0152365]	-0.0155392 [0.0136322]
Year fixed effects			Yes	Yes	Yes
Observations	**662**	**712**	**662**	**662**	**712**

*significant at 10%; **significant at 5%; *** significant at 1%; values in brackets are the standard errors

B. Interpretation

The results obtained are in line with Ross's (2008) findings. In his first differences estimations, Ross (2008) finds that there is a negative correlation between oil rents and female labor force participation rate in a given year. His results remain significant even when dropping huge oil producers such as Saudi Arabia and Kuwait.

One important difference between Ross's study and the results shown in table 1 is that I am using the ratio of female to male labor force participation rate because we are interested in the disparities between men and women in the labor market. Ross simply investigates the effect of oil wealth on female labor force participation rate regardless the effect of oil wealth on that of males. It turns out that an increase in oil abundance results in a wider gap between females and males in the labor market.

The results of these estimations support the hypothesis introduced by Ross (2008). It seems like the type of growth is important for gender equality issues. When growth is a result of an oil boom, women are either being discouraged from joining the labor force because the jobs available are not suitable for them (this is the demand side of the equation), or they are less willing to supply labor because their families are wealthier, and their "reservation wage" is higher (the supply side).

Ross (2008) supports his argument by a case study in which he compares oil-rich Algeria to oil-poor Morocco and Tunisia. He chose these particular states because they are similar historically (all three were French colonies, and they gained independence during the same period). In contrast to oil-rich Algeria, Morocco was able to develop an export-oriented sector, particularly garment and textile, which boosted the participation of women in the labor force.

This higher participation contributed positively to gender equality because women were able to act collectively through associations and unions to gain social, economic, and political rights (Ross, 2008).

The type of growth thus, is important for gender equality issues. The oil sector plays a role in entrenching gender disparities in oil producing countries and should be added to the list of potential contributors to inequality. These results can help better understand why women lag behind men in societies of major oil-rich countries like Middle Eastern or African countries, at least in the labor market.

CHAPTER VII

ROBUSTNESS CHECKS

To check the robustness of these results, I perform further investigations. These investigations include: (1) using the three-year averages data with longer lags, (2) using the yearly data of contemporaneous years with and without year-fixed effects, (3) using oil reserves instead of oil production, and (4) finally using four-year averages instead of 3 years-averages of the data.

A. Using 3 and 4 year lags of the regressors

Column (6) and (7) in table (2) present the results of the fixed-effect model using further lags between dependent and independent variables.

The results of these estimations are consistent with the results from the main specifications. Column (6) and (7) show that a 100 barrels increase in oil production per capita in a certain years decreases the ratio of female to male labor force participation rate by 4.8% in 3 years, and by 5% in 4 years. These coefficients are highly statistically significant at a 5% level.

Even when we remove some of the control variables, the results remain unchanged (columns 8 and 9).

B. Using yearly data with year fixed effects

Table (3) represents the results of further robustness checks using yearly data. In all estimations, the results do not change. Oil production per capita remains highly statistically significant and its magnitude is approximately the same across all specifications.

In equations (13) and (14), I run the same regressions with year fixed effects:

$$logRatio_{it} = \beta_1 \text{ oil income}_{it} + \alpha_i + \phi_t + u_{it} \qquad (14)$$

Where ϕ_t is a set of dummy variables for years

Oil production per capita is statistically significant at the 1% level, and its magnitude is approximately -0.0004 in both equations (13) and (14). Column (13) presents the results of fixed-effect estimation with yearly-fixed effects using yearly data and with a two-year lag between regressors and dependent variable. The results show that a 100-barrel increase in oil production per capita at year t-2 decreases the ratio of female to male labor force participation rate by 4% at year t. The results are the same using contemporaneous values of oil production and the ratio (column 14).

C. Using oil reserves instead of oil production as the independent variable

Estimations (15), (16), and (17) are performed using oil reserves per capita instead of oil production per capita as the independent variable. The results are robust with previous estimations. Oil reserves per capita are statistically significant, even when running a regression on lagged values of independent variables and when including year-fixed effects.

D. Using four-year averages

I repeat the main specifications presented in table (1) using four-year averages of the data instead of the three-year averages. The results are presented in table (5). Using random-effects estimation, oil production per capita has a significant negative effect on the ratio of female to male labor force participation rate (equation 18).

Using fixed-effects estimations, the results are robust even when running the regression with lagged independent variables (equations 20 and 21). On average, a 100 barrels increase in oil production per capita results in a 7% decrease in the ratio of female to male labor force participation rate.

Table 2: Robustness Checks: Using three-year averages

	(6)	(7)	(8)	(9)
Dependent variable	*$LogRatio_t$*	$LogRatio_t$	$LogRatio_t$	$LogRatio_t$
	3 year lags	*4 year lags*		
Oil production per capita	-0.0004813 ** [0.00022759]	-0.0005074 ** [0.0002394]	-0.0005246 ** [0.0002141]	-0.0005246 ** [0.000 2068]
Log GDP	0.0439559 *** [0.0140063]	0.0407255 *** [0.0149482]	0.0483838*** [0.0142487]	0.0387453 *** [0.0137121]
Exports	-2.95e-14 [3.79e-14]	-3.94e-14 [4.36e-14]	-1.57e-14 [3.43e-14]	-1.05e-14 [3.04e-14]
Population	-7.02e-10 *** [1.44e-10]	-7.92e-10 *** [1.57e-10]	-6.19e-10 *** [1.68e-10]	-6.20e-10 *** [1.52e-10]
Conflict	-0.0013565 [0.0132634]	0.0079643 [0.0132668]	-0.0037598 [0.0149676]	
Civil liberties	0.0065074 [0.006767]	0.0052588 [0.0066954]		
Political rights	-0.0020655 [0.005403]	-0.0014679 [0.0053653]		
Year fixed effects	Yes	Yes	Yes	Yes
Observations	**643**	**564**	662	738

*significant at 10%; **significant at 5%; *** significant at 1%; values in brackets are the standard errors

Table 3: Fixed-effect model with yearly data

	(10)	(11)	(12)	(13)	(14)
	$LogRatio_{it}$	$LogRatio_{i\,t}$	$LogRatio_{t}$	$LogRatio_{i\,t}$	$LogRatio_{i\,t}$
		1 yearLag	2 yearLags	2 year lags	
Oil production per capita	-0.0009328 *** [0.0001184]	-0.0009042 *** [0.0001171]	-0.0008716*** [0.0001184]	-0.0004221*** [0.0001222]	-0.0004236*** [0.0001254]
Log GDP	0. 1346909 *** [0.0054656]	0.1282495*** [0.0054096]	0.1283621 *** [0.0052943]	0.0416807 *** [0.0106059]	0.0462276*** [0.00832]
Exports	9.59e-14 *** [1.99e-14]	9.04e-14 *** [1.97e-14]	9.40e-14 [1.93e-14]	-2.50e-14 [1.97e-14]	-2.23e-14 [2.06e-14]
Population	-5.89e-10 *** [1.08e-10]	-6.04e-10 *** [1.07e-10]	-5.88e-10 *** [1.02e-10]	-6.40e-10*** [9.48e-11]	-6.12e-10 [1.02e-10]
Civil liberties	-0.00 11921 [0.0038503]	-0.003388 [0.0038108]	-0.0007584 [0.0037091]	0.0069803* [0.0036348]	0.0091873** [0.0038214]
Political rights	0.000408 [0.0029474]	0.0023166 [0.0029172]	0.0018468 [0.0029055]	-0.0000919 [0.0027473]	-0.0031143 [0.0028174]
Conflict	-0.0053107 [0.00711]	-0.0043897 [0.0070371]	-0.010534 [0.0069532]	-0.0052757 [0.0064876]	-0.0013309 [0.0067279]
Year fixed effects	No	No	No	Yes	Yes
Observations	**1808**	**1808**	**1858**	**1858**	**1808**

*significant at 10%; **significant at 5%; *** significant at 1%; values in brackets are the standard errors

Table 4: Fixed effects using yearly data and oil reserves per capita

	(15)	(16)	(17)
	$LogRatio_{it}$	$LogRatio_{it}$	$LogRatio_{it}$
	Lagged regressors		
Oil reserves per capita	-4.01e-06** [1.93e-06]	-3.74e-06** [1.91e-06]	-6.22e-06*** [1.80e-06]
Log GDP	0.1280597*** [0.006161]	0.1195415*** [0.006091]	0.0174704* [0.0090372]
Exports	1.05e-13*** [2.06e-14]	9.95e-14*** [2.04e-14]	-3.47e-14* [2.08e-14]
Population	-5.78e-10*** [1.12e-10]	-5.82e-10*** [1.10e-10]	-6.16e-10*** [1.03e-10]
Civil liberties	-0.0067509 [0.0042127]	-0.0095542** [0.0041648]	0.0034001 [0.0040841]
Political rights	0.0041042 [0.003153]	0.0060556* [0.0031172]	0.0000193 [0.0029356]
Conflict	-0.0067126 [0.0074191]	-0.006219 [0.0073347]	-0.0017851 [0.0068593]
Year fixed effects	No	No	Yes
Observations	**1686**	**1686**	**1686**

*significant at 10%; **significant at 5%; *** significant at 1%; values in brackets are the standard errors

Table 5: Robustness check using four-year averages

	(18) RE	**(19) FE**	**(20) FE**	**(21) FE**
	LogRatio $_{I\,t}$	LogRatio $_{I\,t}$	LogRatio $_{I\,t}$ 1 year lags	LogRatio $_{I\,t}$ 2 year lags
Oil production per capita	-0.0008714*** [0.0002424]	-0.0009711*** [0.0002446]	-0.0007342*** [0.0002456]	-0.0007447*** [0.0002748]
Log GDP	0.1092035 *** [0.0103313]	0.1370525*** [0.0106951]	0.1272603*** [0.0100613	0.1344622*** [0.0115889]
Exports	1.16e-13*** [3.95e-14]	1.06e-13*** [3.81e-14]	1.01e-13 [3.55e-14]	1.08e-13*** [4.18e-14]
Population	-5.34e-10*** [1.62e-10]	-5.94e-10*** [2.02e-10]	-5.34e-10*** [1.73e-10]	-5.04e-10*** [1.77e-10]
Civil liberties	-0.0082964 [0.0095247]	0.0011764 [0.0091637]	-0.0025079 [0.0083229]	0.0050905 [0.0085065]
Political rights	0.003014 [0.0073486]	-0.0002377 [0.0070615]	0.0027072 [0.0068671]	-0.0072061 [0.0070363]
Conflict	-0.0183351 [0.0195237]	-0.0057886 [0.0186999]	-0.0319338* [0.0168889]	-0.0183801 [0.0175672]
Observations	**516**	**516**	**566**	**536**

*significant at 10%; **significant at 5%; *** significant at 1%; values in brackets are the standard errors

CHAPTER VIII

CONCLUSION

In this study, I investigate the effect of one of the most important natural resources in the curse literature, oil, on gender disparity in the labor market. Previous studies have focused on possible economic and political outcomes of resource wealth. More recent studies such as Ross (2008) and Demeritt and Young (2013) extend the scope of the literature on the resource curse to social outcomes, including gender relations and violation of human rights.

Following Ross's paper on female labor force participation and political representation, I use the ratio of female to male labor force participation rate as measure of disparity between the sexes in the labor market. Labor market outcomes are especially interesting because of the important implications of economic participation on women's lives, including better representation in politics (Ross, 2008).

Achieving gender equality and empowering females is the 5th Sustainable Development Goal (2016). One of the most important targets is to obtain equal opportunities for females in economics and politics and thus, to reduce discrimination against them in all spectrums.

One can argue that the ratio of female to male labor force participation rate might not be the best measure of inequality between the sexes in the economic spectrum, as it does not capture wage differences, working conditions, discrimination against women in higher level positions, or even discrimination against women in some sectors. However, it reveals an interesting outcome that can be built upon if data on other indicators (such as number of females in managerial positions, women's share of ownership in firms…) become available.

This study confirms the existence of a link between oil wealth and gender outcomes at least in the labor market, offering a more nuanced picture of gender disparity than conventional research that attributes gender issues to cultural aspects and religion.

It also has important policy implications in oil-rich countries, as governments need to promote actions that mitigate the negative effect of the oil sector on gender issues because labor participation is an important channel through which women can acquire better social standards, primarily through achieving financial independence.

Of course, the type of policies that need to be implemented depends on the causal mechanism behind this significant negative association between the oil sector and our outcome of interest.

Again, this study is limited to investigating the existence of this link, and it does not in any way look into the mechanism behind it. The Dutch Disease model alone is not sufficient to serve as an explanation as it does not reflect what is really happening in countries like Saudi Arabia or the UAE.

Thus, further studies must examine possible mechanisms that explain this relationship. Possible methods include performing the same specifications for different samples of countries, divided on the basis of region for instance. This allows for capturing cultural and religious differences that might as well play an important role in shaping gender relations as suggested by previous literature.

Moreover, it would be plausible to check the effect of oil production on male labor force participation rate because channels like the unearned income that Ross (2008) discussed might work equally for men as well.

For now, this study has successfully proved the existence of a link between the oil sector and one of the gender outcomes, namely female labor force participation. What is important is finding a causal mechanism that justifies this existence in order to be able to suggest possible solutions.

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APPENDIX

Appendix A: Summary Statistics

Variable	N	Mean	Standard deviation	Minimum	Maximum
RatioFtM (%)	1852	65. 80267	20.00037	12.02	100.67
Log Ratio	1852	4.121707	0.3980221	2.486572	4.611848
Log GDP	1903	25.41067	1.927928	19.18418	30.41658
Exports	1903	1.25e+11	2.42e+11	5.41e+07	2.21e+12
Population	1903	5.55e+07	1.36e+08	179028	1.34e+09
Oil production(1000 barrels/day)	1859	738.359	1559.552	0	10107.09
Oil per capita (production)	1859	19.61513	51. 79868	0	457.1043
Oil reserves (billion barrels)	1730	9. 264202	27.6694	0	297.74
Oil per capita (reserves)	1730	717.5021	2870.835	0	33854.96
Civil liberties	1903	3.491855	1.871478	1	7
Political rights	1903	3.4866	2.24866	1	7

Note: Log ratio is the logarithm of the ratio of females to males labor force participation rate

Appendix B: Hausman-test results

	Coefficients (b) random	(B) fixed	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
oilpercapita	-.0009012	-.0009328	.0000316	7.96e-06
loggdp	.1263097	.1346909	-.0083811	.
exportsofg~n	9.84e-14	9.59e-14	2.55e-15	3.21e-15
populati~tal	-5.79e-10	-5.89e-10	1.06e-11	.
civilliber~s	-.003511	-.0011921	-.0023189	.0006469
politicalr~s	.0009868	.000408	.0005788	.0004968
conflictdu~y	-.0077015	-.0053107	-.0023909	.0013209

```
                     b = consistent under Ho and Ha; obtained from xtreg
      B = inconsistent under Ha, efficient under Ho; obtained from xtreg

 Test:  Ho:  difference in coefficients not systematic

               chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                       =       94.35
             Prob>chi2 =      0.0000
             (V_b-V_B is not positive definite)
```

The above table represents the results of the Hausman test. Probability>chi^2=0 (less than 0.05) allows us to reject the null hypothesis and use fixed effects.