Is Economic Growth Good for Women's Agency?

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Abstract

This paper analyzes the effect of economic growth on women's agency. Women's agency is measured across three dimensions: personal freedom, participation in household decisions, and perception of gender roles. The data were taken from three samples of a national-state representative survey on women's agency in Mexico. Using fixed effects at the state level, the study finds: (1) suggestive evidence that economic growth enhances women's personal freedom through the industrial and service sectors; (2) heterogeneous effects of economic growth on household decisions, the main beneficiaries of which are less educated and indigenous women; and (3) there is no evidence that economic growth affects the perception of gender roles.

Keywords: GDP; personal freedom; gender roles; household decisions.

JEL: J12, J16, J22.

1 Introduction

Can economic growth improve women's agency? Duflo (2012) suggests that economic growth can generate employment opportunities for women, improve their income, and increase their bargaining power within the household. However, some scholars, such as Kabeer (2016), argue that economic growth will have little or no impact on women's agency because there is no guarantee that it will soften the social norms that create inequalities in the first place. Likewise, Moghadam (2003) mentions that the sexual division of labor, which has historically affected women, can have negative consequences for women's agency if the patterns of growth generate forms of employment that favor male workers.

The current paper analyzes the effects of economic growth on women's agency. The data were taken from the 2006, 2011 and 2016 National Survey on Relationships within the Household (ENDIREH), a national-state representative survey on women's agency in Mexico. Specifically, three measures of women's agency were considered, namely, personal freedom, perception of gender roles, and participation in household decisions. Using fixed effects at the state level, the study finds suggestive evidence that: (1) economic growth increased women's personal freedom by 0.04 standard deviations[1]; yet, there is no evidence that economic growth impacted

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[1] An average growth of 2 percent compounded over 10 years (22 percent) was assumed. This effect was calculated as follows: $(0.203/100) * (22\%) = 0.04$, where 0.203 was the coefficient associated with the economic growth in a linear-log regression model. Also, 2 percent was taken

household decisions or the perception of gender roles. As a robustness test for omitted variable bias, a bounding strategy was used following Altonji et al. (2005) and Oster (2017). In addition, an instrumental variable approach was conducted following Lewbel (2012) to check for reverse causality. Under the assumptions of these strategies, the results presented are robust. (2) Then, I analyze which economic sector (agriculture, industry, or services) was the mechanism through which economic growth influenced women's personal freedom. I find suggestive evidence that economic growth enhances women's personal freedom through the industrial and service sectors. (3) Finally, I find evidence of heterogeneous effects regarding economic growth on household decisions, the main beneficiaries of which are less educated and indigenous women.

This work relates to literature studying the effects of economic growth on women's agency. Using data from the Demographic and Health Survey (DHS) for 36 countries, Braga et al. (2018) found that increases in GDP were associated with women making major household purchases (household decisions) and visiting family and friends (personal freedom). Hanmer and Klugman (2016), using data from the Demographic and Health Survey (DHS) for 58 countries, found a positive link between economic growth and women's agency. While these studies controlled for several well-known variables related to women's agency, their results

as the benchmark because this was the average economic growth in the period of 2006-2016.

could potentially be biased as a consequence of omitted variables and as a result of a potential problem of reverse causality. Another limitation of these studies is that they analyze the effect of economic growth at an aggregate level despite the fact that, as Moghadam (2003) mentions, there can be a variety of patterns when considering economic growth by sector of activity.

The present paper makes three main contributions. First, it confirms the results from previous studies (Braga et al. (2018), and Hanmer and Klugman (2016)), which suggest that economic growth benefits women's personal freedom. In addition, I find suggestive evidence that this result is related to economic growth in the industrial and service sectors. Second, I do not find evidence that economic growth affects household decisions. Yet, I find suggestive evidence of heterogeneous effects where the least educated and indigenous women are the most benefited. One possible explanation is that more educated and non-indigenous women already enjoyed a high participation in household decisions and, therefore, they did not benefit from economic growth. Finally, there is no evidence that economic growth influenced the perception of gender roles. This result supports the hypothesis of Kabeer (2016) that economic growth has little or no impact on softening social norms.

The remainder of this paper is organized as follows. Section II presents a literature review on the relationship between economic growth, female employment, and women's agency. Section III describes the data and empirical methods used. Section IV presents the results and Section V concludes.

2 Economic Growth, Female Employment, and Women's Agency

2.1 Women's Agency and Women's Empowerment

Donald et al. (2020) define women's agency as their ability to set goals and act on them, make decisions that matter to them, and participate in the economy and public life. In addition, they differentiate between agency and empowerment, specifically, they define empowerment as an improvement in wellbeing across health, education, economic opportunities, and public life.

Chang et al. (2020) point out that there is a variety of methodologies to measure women's agency and empowerment. For example, the Gender Inequality Index proposed by the United Nations Development Programme (UNDP)[2] or the Women's

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[2]This index measures gender inequality through three aspects: (1) empowerment (female population with at least secondary education and female shares of parliamentary seats), (2)

Empowering in Agriculture Index (WEAI).[3] Given this diversity of approaches, Chang et al. (2020), influenced by Laszlo et al. (2017) and Kabeer (1999), propose four domains related to agency: (1) household decision-making (women's participation in household decisions), (2) personal freedom (women's ability to choose where and when to go), (3) attitudes toward gender norms (women's aspirations, self-efficacy, and attitudes to gender norms), and (4) freedom from violence (women's ability to live free from emotional, physical, or sexual violence). In addition, they identify three domains related to empowerment: (1) family (the contraceptive use and the timing of marriage and childbearing), (2) economic force participation (labor force participation and income generation from entrepreneurship), and (3) political and community domain (participation in politics and community decision-making, voting, and participation in groups and ties within a community). In this paper, I will use this taxonomy to measure women's agency.

2.2 Economic Growth and Female Employment

Duflo (2012) suggests that economic growth can generate employment opportunities for women, thus improving their income (empowerment), and increasing

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labor markets (female labor force participation), and (3) health (maternal mortality ratio and adolescent birth rate).

[3]This index was developed by Alkire et al. (2013) and it measures agency and empowerment through: (1) decisions on agricultural production, (2) access to and the decision-making power regarding productive resources, (3) control use of income, (4) leadership in the community, and (5) time allocation.

their bargaining power within a household (agency). Yet, Boserup (1970) points out that economic growth does not necessarily benefit women and men equally. For example, using data from Africa, Asia, and Latin America, she found that women participate in the agriculture sector using more primitive techniques than men or are employed in low-wage and unskilled jobs in the manufacturing sector. In addition, the relationship between economic growth and female employment is not necessarily linear. Sinha (1967) suggests that there is a U-shaped relationship between female labor force participation and economic growth. Goldin (1995) suggests that female labor demand increases with the economic growth in the agriculture and the service sector, and the female labor demand is stable or declines with the growth in the industrial sector (mining, construction, and other heavy industries). Goldin (1995) and Mammen and Paxson (2000) find evidence that supports the U hypothesis. Yet, Gaddis and Klasen (2013), using data from 178 countries, fail to find consistent support for the U hypothesis.

2.3   Female Employment and Women's Agency

The previous literature suggests that economic growth can have some effects on female employment and female employment further on women's agency. In this sense, the evidence presents mixed results regarding the effects of female employ-

ment on household decision-making and personal freedom. Kabeer et al. (2013), using data from Bangladesh, Ghana, and Egypt, find that formal employment consistently explains improvements in household decision-making and in personal freedom. Yet, women were largely excluded from certain production activities (such as mining) in the case of Ghana. In Bangladesh, women benefited from jobs related to export-oriented sectors. In Egypt, the mechanism appears to be related to a public policy that guarantees access to public-sector jobs regardless of gender. Yet, there is some evidence based on randomized controlled trials (RCTs) showing that access to jobs did not affect household-decision making. Kotsadam and Villanger (2020), using an RCT that assigns jobs to equally qualified female applicants in Ethiopia, find that the intervention increased women's employment but that it did not change women's participation in household decisions, such as children's schooling or health. Clark et al. (2019), using an RCT that offered subsidized child care in Kenya, find an increase in women's labor participation, which, however, did not translate into women's participation in household decisions except for those pertaining to children's health care.

Regarding gender norms, Kabeer (2016) suggests that economic growth will have little to no impact on gender roles. Groh et al. (2012), analyzing a program that provided female high school graduates with a job voucher in Jordan, find no

effects on attitudes towards the role of women. Some evidence shows that variables that can impact social norms are linked to historical origins and sex-ratios. Alesina et al. (2013) find that societies that traditionally practiced plough agriculture nowadays are characterized by less equal gender norms. Grosjean and Khattar (2018), using data from Australia, show that in areas with a more male-biased sex ratio, both men and women still have more conservative attitudes towards women working.

Another important element of agency is living free from violence. There is no consistent evidence regarding the effects of female labor supply on intimate partner violence (IPV). Aizer (2010), using data from the USA, finds that demand for female labor decreased the wage gap and reduced violence against women. Yet, Kotsadam and Villanger (2020), when analyzing a random assignment of jobs to women, find no effects on IPV.

To sum up, it is possible that, through women's employment, economic growth affects women's agency (household decision-making, personal freedom, gender norms, and freedom of violence); yet, the evidence is mixed. In particular, there is evidence that: (1) women's employment can enhance their personal freedom, (2) the evidence is mixed regarding the effects of women's employment on household

decisions, (3) women's employment does not translate into a shift towards more favorable attitudes regarding gender roles, (4) there is no consistent evidence that women's employment decreases intimate partner violence (IPV), and (5) women's employment in the service sector may improve women's agency (like jobs in the public sector), but women's employment in the industrial sector may translate into a decline of women's agency (like jobs in the mining sector).

3 Data and Empirical Methods

3.1 Description of Data

To estimate the impact of economic growth on women's agency, data were drawn from the National Survey on Relationships within the Household (ENDI-REH (2006), ENDIREH (2011), and ENDIREH (2016)). ENDIREH is a national- and state-level representative survey conducted in Mexico that collects data on women's agency among women aged 15 or older, who are: (1) in a relationship (married or cohabiting), (2) previously married (divorced, separated, or widowed), and (3) single. For the purposes of the current paper, the sample was restricted to women living with their husbands (married or cohabiting) and who were between 15 and 60 years old. Thus, the final sample consisted of 183,072 women

interviewed.

The data on GDP per capita at the state level were taken from Mexico's National Institute of Statistics and Geography (INEGI) for the years 2006, 2011 and 2016. Table 1 and Figure 1 present information regarding GDP per capita at the state level. Here, a great variation can be observed between states growing at an average rate of 2.9% and states with a zero or even negative growth in the period of study.

ENDIREH provides information for three categories of women's agency: personal freedom (seven items), gender roles (three items), and participation in household decisions (four items). Table 2 presents each item by category. Responses to the questions regarding personal freedom adopt a value of one when a female respondent records not having to ask permission from her husband, and zero, otherwise. Answers to the questions regarding gender roles take a value of one when the respondent marks an affirmative response, and zero, otherwise. Finally, responses to questions regarding the participation in household decisions adopt the value of one if the respondent records participating either jointly (with her partner) or independently, and zero, otherwise. Using these items, an index based on principal components was developed. Following this, the value of the index was

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standardized to have a mean of zero and a standard deviation of one.

Table 2 compares the measurement of women's empowerment with respect to GDP per capita. Here, "Treatment" refers to information regarding women's empowerment above the median GDP, and "Control" refers to data that fall below that median. Panel A presents information regarding personal freedom. Women living in states with a GDP above the median were found to have higher levels of personal freedom (0.04 SD), compared to those living in states with a GDP below it (-0.04 SD). Panel B presents information regarding household decisions, where it can be observed that women participated more when GDP was above the median. Finally, Panel C presents information regarding gender roles, indicating that women living in states with a GDP above the median tended to favor male gender roles to a lesser extent.

Panel D of Table 2 includes information for control variables that will be used. I include female characteristics such as age, education, speaking an indigenous language, the number of times women have been married, and having experienced violence in the family of origin (blows, being beaten, and insults). I also include partner characteristics such as age, education, and speaking an indigenous language. Finally, I include the characteristics of having children that are 18 years

old or younger, and cohabitation.

Panel D of Table 2 also includes the following controls: remittances, cash transfers from PROGRESA, homicides per 100,000 inhabitants, having unilateral divorce at the state level, inequality (Gini coefficient), and sex ratio (males to females). There is evidence that monetary transfers are associated with changes in intra-household bargaining power (Aker, Boumnijel, McClelland, and Tierney (2016), and Bergolo and Galván (2018)). Thus, I include information on monetary transfers to households such as remittances, and cash transfers from PROGRESA.[4] Also, it should be noted that during the period of analysis, Mexico was involved in a drug-related violence. There is evidence that the spike in violence measured by homicides is associated with a lower women's participation in household decision-making (Tsaneva et al., 2018). Thus, as a control, I include the number of homicides per 100,000 inhabitants. Another variable that can affect household decisions is related to divorce laws (Chiappori et al., 2002). According to this hypothesis, unilateral divorce[5] increases the bargaining power of the person who is willing to leave the marriage. During the period of analysis, Mexico implemented unilateral divorce (Hoehn-Velasco and Silverio-Murillo, 2020), thus I control for states that implemented said policy. Regarding inequality, Vogler (1998) proposes that in-

[4]PROGRESA is a monetary transfer program, conditional on sending the children of a given household to school.

[5]Unilateral divorce is a legal instrument in which both spouses can end a marriage without having to prove grounds for absolute divorce.

equality can affect the bargaining power within a household. According to Vogler, the household is a mini system akin to a broader society, characterized by similar consequences for gender relations. Christian et al. (2015) find that an increase in inequality (measured by the Gini coefficient) is associated with an increase in the United Nation's Gender Inequality Index. In this paper, I control for inequality using a Gini index at the state level. Finally, I include the sex ratio (males to females) as a control. The evidence suggests that the sex ratio has consequences for the perception of gender roles (Grosjean and Khattar, 2018).

3.2   Empirical Strategy

To estimate the effect of economic growth on women's agency, a fixed effects strategy is employed at the state level. The robustness of these results will be checked using the bounding methodology proposed by Oster (2017)[6], and the instrumental variable strategy proposed by Lewbel (2012)[7]. While Oster (2017) and Lewbel (2012) methodologies do not establish causality, under some assumptions, they can provide information regarding how robust the results are using fixed effects. The fixed effects regression is as follows:

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[6]A number of recent empirical studies use Oster's bounding methodology combined with fixed effects; see, for example, Nghiem et al. (2015), and Walther (2018).

[7]A number of recent empirical studies use the Lewbel method as an alternative to the standard instrumental variable approach; see, for example, Emran and Hou (2013), Chowdhury et al. (2014), and Deuflhard et al. (2018).

$$Y_{ist} = \beta_0 + \beta_1 T_{st} + \beta_2 X_{ist} + \theta_s + \gamma_t + e_{ist} \qquad (1)$$

where Y_{ist} is a variable measuring women's agency for women i, in state s and year t; T_{st} is the natural logarithm of per capita GDP; X_{ist} is a vector of controls; θ_s is a set of state-fixed effects, and γ_t is a set of year dummies. Standard errors are clustered at the state level to correct for autocorrelation of the outcome measure across years within a state. The coefficient of interest is β_1, which represents the effects of GDP on women's agency.

While state-fixed effects accounted for the unobserved time-invariant characteristics across the states, it is still possible that unobserved time-variant characteristics may have affected the results. To verify the robustness of the results, the bounding approach proposed by Altonji et al. (2005) and refined by Oster (2017) was employed. Altonji et al. (2005) observed that a common approach to evaluate robustness to omitted variable bias has been to include additional control variables on the right-hand side of the regression. If such additions do not affect the coefficient of interest, then this coefficient can be considered as unlikely to be biased. This strategy implicitly assumes that the selection on observables is informative about the selection on unobservables. Oster formalizes this idea and provides conditions for bounds and identification. Namely, if the bounds exclude zero, then the results from the regression can be considered robust to omitted

variable bias.[8]

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[8]Following the notation in Oster, the full model takes the following form:

Y= β T + X_1 + X_2 +ϵ.

where T is the variable of interest, X_1 contains the *observed* control variables multiplied by their coefficients, i.e., $X_1 = \sum_{j=1}^{J_o} X_j^o \gamma_j^o$, and X_2 contains all *unobserved* variables multiplied by their coefficients, i.e., $X_2 = \sum_{j=1}^{J_u} X_j^u \gamma_j^u$. Finally, ϵ is a random error representing the measurement error in Y, and is uncorrelated with X_1, X_2 and T. Oster suggests the following approach to account for omitted variable bias:

(1) Regress Y on T, and report the parameter on T, denoted by β^0, and the R-squared coefficient, denoted by R^0.

(2) Regress Y on T and X_1, and report the parameter on T, denoted by $\tilde{\beta}$, and the R-squared coefficient, denoted by $\tilde{R}$.

(3) Define R_{max} as the overall R-squared of the model, that is, the R-squared that would be obtained from a regression of Y on both observables (T, X_1) and unobservables (X_2).

(4) Define δ to be a parameter that ensures equality $\frac{Cov(T,X_2)}{Var(X_2)} = \delta \frac{Cov(T,X_1)}{Var(X_1)}$. In other words, this relationship formalizes the idea of Altonji et al. (2005) that the magnitude and sign of the relationship between T and X_1 provides some information about the magnitude and sign of the relationship between T and X_2. For example, if $-1 \leq \delta \leq 1$, then the variable of interest (T) is no more correlated with the unobservables (X_2) than it is correlated with the observables (X_1). The case $0 \leq \delta \leq 1$ has a similar interpretation, with the additional assumption that the relationship between T and X_1 has the same sign as the relationship between T and X_2.

Oster shows that $\beta^* \approx \tilde{\beta} - \delta \frac{(\beta^0 - \tilde{\beta})(R_{max} - \tilde{R})}{(\tilde{R} - R^0)}$ is a consistent estimator of the effect of T on Y, β. It should be noted that this is a close approximation to the consistent estimator and is used to present the intuition regarding the methodology. The complete approximation is presented in Oster (2017).

In order to estimate β^*, estimates of δ and R_{max} are required. Oster proposes assumptions for δ and R_{max} that allows one to determine whether β^* is different to zero. Oster proposes that $R_{max} = min\{1.3\tilde{R}, 1\}$, where $\tilde{R}$ is as defined above. The cut-off value of 1.3 is derived from a sample of papers containing randomized controlled trials and nonrandomized data, and published in the *American Economic Review*, *Quarterly Journal of Economics*, *The Journal of Political Economy*, and *Econometrica* from 2008-2010. She determined that using this cut-off allowed 90% of the randomized and 50% of the nonrandomized results to continue being statistically significant. After determining the value of R_{max}, Oster suggests that β^* be calculated for all the following ranges of δ: $0 \leq \delta \leq 1$ (the current paper also presents the results for δ: $-1 \leq \delta \leq 0$), enabling the construction of the set: $[\tilde{\beta}, \beta^*]$. If this set excludes zero, the results from the controlled regressions can be considered to be robust to omitted variable bias. In other words, the results indicate that $\beta^* \neq 0$.

Another problem with specification (1) is a potential reverse causality. For example, it could be the case that women's agency may impact economic growth. A widely used alternative to identifying causal relationships is the use of instrumental variables. However, finding an appropriate instrument is often difficult in practice. Another way of dealing with this endogeneity problem has been proposed by Lewbel (2012), who suggests the inclusion of an instrumental variable generated through heteroscedasticity. In particular, he proposes the exploitation of the correlation between the exogenous variables and heteroscedasticity of the model disturbances in order to achieve identification without imposing any exclusion restrictions. Following Lewbel, the reverse causality effect can be modeled as follows:

$$T_{st} = \gamma_1 Y_{ist} + \gamma_2 X_{ist} + \gamma_s + \gamma_t + \xi_{ist} \tag{2}$$

Where the variable T_{st} represents the potential endogenous variable (GDP). Y_{ist} and X_{ist} are as defined in equation (1) and ξ_{ist} is the error term. The heteroscedasticity-based identification strategy assumes the existence of heteroscedasticity in ξ_{ist} (and, consequently, in T_{st}). In particular, it is assumed that: $cov(X_{ist}, \xi_{ist}^2) \neq 0$. Lewbel suggests using $[X_{ist} - E(X_{ist})]\hat{\xi}_{ist}$ as an instrument for T_{st} in estimating (1), where $\hat{\xi}_{ist}$ denotes the predicted residuals obtained by estimating equation (2), excluding Y_{ist} on the right-hand side. Finally, Lewbel points out that the

condition $cov(X_{ist}, \xi_{ist}^2) \neq 0$ needs only to apply for a subset, Z_{ist}, of the vector X_{ist}. More detailed explanations can be found in Lewbel (2012).

4   Results

4.1   Effects of GDP on Women's Agency

The fixed effect results of aggregate economic growth (GDP) on women's personal freedom are presented in Table 3, controlling for female characteristics, partner and household characteristics, and state characteristics.[9] Columns 1 to 7 present linear regression results for each question measuring personal freedom. It can be seen that almost all of the items here were found to be statistically significant and positive: work (0.043), shopping (.047), visiting relatives (0.043), buying something for oneself (0.062), making friends (0.052), and freedom of vote (0.123). The only item that did not emerge as statistically significant was that of freedom of policy participation. Column 8 presents the effect of economic growth on the index regarding personal freedom using the principal component analysis. A positive effect of GDP per capita on personal freedom can be observed (0.203). To

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[9]Female characteristics include age, education, speaking an indigenous language, and violence within a family of origin. Partner and household characteristics cover partner's age, education, and speaking an indigenous language. Respondents having children of 18 years old or younger and the cohabitation status are also included. State characteristics include homicides per 100,000 inhabitants, unilateral divorce in the state, sex ratio (males to females), inequality (Gini coefficient), and living in a rural area.

put the size of this effect in perspective, a woman living in a state experiencing a 2 percent annual rate of increase in GDP compounded over 10 years (22 percent) is here predicted to experience an increase of 0.04 standard deviation in her personal freedom.[10]

Table 4 presents the results for the effects of economic growth on the perception of gender roles that favor men. As in the previous case, Columns 1 to 3 exhibit the results for each question item, and Column 4 shows the index regarding gender roles using the principal component analysis. A positive effect of economic growth emerged on the following variables: "a man must take responsibility for all of the family's expenses" (Column 1), and "it is the wife's obligation to have sex with her husband even if she does not want to" (Column 3). Yet, these effects were not statistically significant. In addition, economic growth was found to have a negative effect on the item "a woman does not have the same capacity as a man to earn money" (-0.033), the coefficient of which was statistically significant (Column 2). Finally, a positive effect of economic growth could be observed in the index of gender roles' perception, although it was not statistically significant.

Table 5 presents the results for women's household decision-making. Columns

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[10]The effect was calculated as follows: $(0.203/100) * [(1 + 0.02)^{(10)}] = 0.04$. The 2 percent was used as a reference point because it represented the average economic growth from 2006-2016.

1 to 4 yield the results for each question item, and Column 5 shows the index regarding household decisions. Economic growth was here found to have a positive effect on the following variables, although it was not statistically significant: "using the money you earn" (Column 1), "permits for daughters and sons" (Column 3), and "having sex" (Column 4). A positive and statistically significant effect was found on "deciding how money is spent" (Column 2). However, there was no statistically significant effect of economic growth on the index regarding household decisions (Column 5).

Fixed effects control for time-invariant omitted variables, but this technique does not eliminate time-variant omitted variables. Thus, the range of estimated parameters was approximated using a bounding methodology proposed by Oster (2017). The effects of GDP were checked on: (1) personal freedom, (2) gender roles that favor males, and (3) women's participation in household decisions. Table 6 presents the results of the bounding methodology. As can be seen, only the bounds for personal freedom exclude zero, suggesting that this result was robust to the problem of omitted variable bias.

Although the results appear to be robust under the assumptions of the bounding methodology proposed by Oster (2017), there may have been a problem of

reverse causality. For example, personal freedom may have impacted economic growth, rather than the other way around. To check the robustness of the results, a strategy of instrumental variables was applied. Table 7 presents the results of using an instrumental variable constructed through heteroscedasticity, following Lewbel (2012). Using this strategy, the results that were observed using the fixed effects and the bounding methodology are maintained. Nevertheless, a small decrease could be observed in the effect of GDP on personal freedom.[11]

4.2 Effects of GDP by Sector of Economic Activity on Women's Personal Freedom

The previous results suggest that economic growth enhances women's personal freedom. But, which sector of economic activity is the one that contributes to increase personal freedom the most? In particular, the following hypothesis can be formulated regarding economic growth in the agriculture, industrial, and the service sectors and their effects on personal freedom:

- Agriculture: the effect of economic growth in the agricultural sector on women's personal freedom is ambiguous. Based on the U hypothesis, a pos-

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[11]The first-stage regression in equation (2) was estimated by excluding Y_{ist}, and heteroscedasticity was tested for using a Breush-Pagan test. According to this test, (GDP, $chi^2 = 546$, p-value=0.00), there was strong evidence for heteroscedasticity.

itive effect can be expected because female labor demand will increase with economic growth in agriculture (Goldin, 1995). Yet, other hypothesis establishes that economic growth in the agricultural sector does not necessarily benefit women and men equally (Boserup, 1970).

- Industrial: the effect of economic growth in the industrial sector can be either positive or negative. Gaddis and Klasen (2013) observe that women increasingly participated in export-oriented industries and other light manufacturing industries. But also, Gaddis and Klasen (2013) observe that sectors such as mining do not necessarily increase women's employment. Finally, Goldin (1995) proposes that female labor demand will be stable or decline with the growth in the industrial sector.

- Services: a positive effect of economic growth in the service sector is expected on women's personal freedom. Goldin (1995) proposes that female labor will increase when there is economic growth in the service sector. In addition, there is evidence that economic growth in the service sector boosts women's personal freedom. For example, Kabeer et al. (2013) find that the sector of economic activity that contributed to women's personal freedom in Egypt was the creation of jobs by the public sector.

To test these hypotheses, I use the following specification based on Gaddis and

Klasen (2013):

$$Y_{ist} = \beta_0 + \beta_1 * s(agric_{st}) * log(agric_{st}) + \beta_2 * s(ind_{st}) * log(ind_{st})$$

$$+\beta_3 * s(serv_{st})log(serv_{st}) + X_{ist}\Pi + \theta_s + \gamma_t + e_{ist}$$

where Y_{ist} is a variable measuring women's personal freedom i, in state s and year t; $s(sector)$ is the share of the sector of reference with respect to the GDP in state s at time t; $log(sector)$ is the natural logarithm of per capita GDP of the sector of reference in state s at time t; X_{ist} is a vector of controls; θ_s is a set of state-fixed effects, and γ_t is a set of year dummies. Standard errors are clustered at the state level. The coefficients of interest are β_1, β_2, and β_3, which represents the growth of each sector weighted by the sector's share on the GDP at the state level (Gaddis and Klasen, 2013).

Table 8 presents the effects of GDP by economic activity on women's personal freedom. Column 1 controls exclusively for fixed effects at the state and year level. Using this specification, I find that only the industrial sector is statistically significant at the 10 percent level. Column 2 includes controls for female and partner characteristics, family, and variables at the state level. Using this specification, the results show that the industrial sector is statistically significant at the 5 percent

level and the service sector is statistically significant at the 10 percent level.

4.3   Heterogenous effects

Another aspect worthy of analysis was the possibility of having heterogeneous effects on women's agency. For example, Kabeer et al. (2013) suggest that in the case of Bangladesh, Ghana, and Egypt, educated women were the ones who benefitted the most from economic growth. Apart from women at different education levels, another important group in the context of Mexico is that of indigenous women. Due to social norms, indigenous women are unlikely to obtain benefits from economic growth. It is also possible that young women get more benefits from economic growth than older women. Finally, another group of interest is that of women with children. Women who have many children are less likely to obtain benefits from greater economic growth.

Table 9 presents the heterogeneous effects regarding women's education (1 if they completed secondary education or above and zero, otherwise); indigenous women (1 if they speak an indigenous language and 0, otherwise); women's age (1 if they are between 15 and 25 years old and 0, otherwise); and the number of children (1 if they have two or more children and zero, otherwise). Panel A

presents the results for personal freedom, Panel B for male gender roles, and Panel C for household decisions.

In the case of education, it was found that women with a lower educational level obtained more benefits from economic growth in terms of household decisions. I do not find evidence of heterogeneous effects regarding age. With respect to indigenous women, the findings indicate that they received more benefits from the economic growth in terms of personal freedom and household decisions. Finally, no evidence was found as to the heterogeneous effects regarding the number of children.[12]

4.4   Discussion of Results

The results presented here suggest that economic growth can contribute to women's personal freedom. This result is in line with the findings of Kabeer et al. (2013) where they found a similar result using cross-sectional data from Bangladesh, Ghana, and Egypt. Kabeer et al. (2013) suggest that the service sector is the po-

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[12]One possible explanation of these heterogeneous effects can be that less educated and indigenous women have a lower participation in household decisions and, therefore, they benefit more from economic growth. For example, I find that from the four questions that compose the index of household decisions, indigenous women make decisions alone or with their partner in 3.0 items on average, while non-indigenous women in 3.4 in 2006. A similar pattern is observed in education. Women with secondary education or with a higher educational level make, on average, 3.6 decisions while women with primary or no education only 3.2 decisions in 2006.

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tential mechanism. In the case of Mexico, the results suggest that the mechanism is through the industrial and service sectors.

The current study finds no effects of economic growth on household decisions. This result supports findings from randomized control trials that use interventions to increase female employment, and they find no effects on household decisions (Kotsadam and Villanger (2020), and Clark, Kabiru, Laszlo, and Muthuri (2019)). Yet, I find heterogeneous effects where indigenous women and women with a lower educational level improved the participation in household decisions as a consequence of economic growth.

Finally, I do not find evidence that economic growth impacted the perception of gender roles. This result is in line with the hypothesis formulated by Kabeer (2016). There is evidence suggesting that the perception of gender roles is related to historical origins (Alesina et al., 2013) or sex ratios, (Grosjean and Khattar, 2018). Yet, some interventions through giving information to adolescents regarding gender equality appear to have increased adolescents' support for gender equality in India (Dhar et al., 2018). Given the limitations of economic growth on gender roles, it will be necessary to explore if interventions providing information to adolescents can be replicated in other contexts and can improve gender equality.

5　Conclusion

This paper analyzes the effects of economic growth on three measures of women's agency: personal freedom, household decisions, and gender roles. Using fixed effects models at the state level and three rounds of a national-state representative survey focusing on women's agency, the current study found that: (1) economic growth enhanced women's personal freedom; yet, there is no evidence that, on average, economic growth impacted household decisions or the perception of gender roles. (2) Then, I find suggestive evidence that economic growth increases women's personal freedom through the industrial and service sectors. (3) Finally, I find evidence of heterogeneous effects of economic growth on household decisions, the main beneficiaries of which are less educated and indigenous women. Economic growth can increase some indicators of women's agency such as personal freedom, but the evidence suggests that it cannot improve other aspects such as gender roles. Given the limitations of economic growth, it will be necessary to explore successful interventions that improve attitudes towards gender roles.

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6   Appendix

Figure 1: Per Capita Economic Growth 2006-2016

Economic Growth 2006-2016

(1.55,2.9]
(1.05,1.55]
(.55,1.05]
[-6.9,.55]
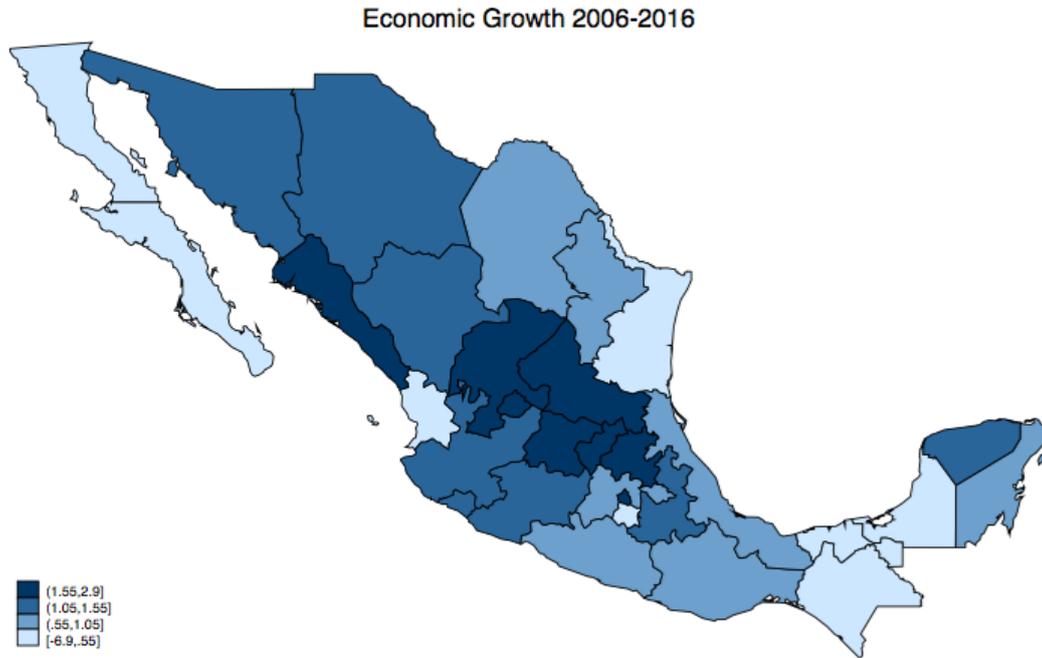
Table 1: Per Capita Economic Growth (2006-2016)

	Log GDP 2006	Log GDP 2016	Growth
	(a)	(b)	(c)
Aguascalientes	11.7	12.0	2.9
Guanajuato	11.4	11.7	2.8
Zacatecas	11.3	11.5	2.5
Distrito Federal	12.5	12.7	2.4
Querétaro	11.9	12.2	2.3
San Luis Potosí	11.5	11.7	1.9
Hidalgo	11.3	11.4	1.6
Sinaloa	11.6	11.7	1.6
Michoacán	11.2	11.4	1.5
Colima	11.7	11.8	1.4
Jalisco	11.7	11.9	1.3
Chihuahua	11.7	11.9	1.3
Yucatán	11.5	11.6	1.3
Sonora	12.0	12.2	1.3
Durango	11.5	11.6	1.2
Puebla	11.3	11.4	1.1
Nuevo León	12.3	12.4	1.0
Guerrero	11.0	11.1	1.0
Oaxaca	11.0	11.1	0.9
Quintana Roo	11.9	12.0	0.9
Veracruz	11.4	11.5	0.9
México	11.3	11.4	0.8
Tlaxcala	11.2	11.2	0.7
Coahuila	12.1	12.2	0.6
Nayarit	11.4	11.5	0.5
Tabasco	12.2	12.3	0.5
Baja California Sur	12.0	12.0	0.2
Chiapas	10.9	10.9	0.1
Morelos	11.5	11.5	0.0
Baja California	11.9	11.9	-0.3
Tamaulipas	11.9	11.8	-0.5
Campeche	14.1	13.4	-6.9

Note: The data on GDP is taken from the National Institute of Statistics and Geography. The data regarding population is taken from the National Council of Population.

Table 2: Descriptive Statistics

	GDP Per Capita	
	Treatment	Control
Panel A. Personal freedom		
Personal freedom index (standardized)	0.04	-0.04
Work for a payment or compensation	0.22	0.20
Go shopping	0.30	0.29
Visit relatives or friends	0.24	0.22
Go buy something for you	0.56	0.54
Participate in any activity or policy	0.38	0.33
Make friends with a person that your partner does not know	0.67	0.64
Vote for a party or candidate	0.81	0.77
Panel B. Household decisions		
Household decisions index (standardized)	0.04	-0.04
What to do with the money you earn or that you have	0.95	0.94
How the money is spent	0.93	0.92
On permits for daughters and sons	0.92	0.90
When having sex	0.93	0.92
Panel C. Gender roles		
Gender roles index (standardized)	-0.09	0.09
The man must take responsibility for all the expenses of the family.	0.51	0.58
A woman does not have the same capacity as a man to earn money.	0.12	0.17
It is the wife's obligation to have sex with her husband	0.09	0.11
Panel D. Control Variables		
Woman's age	38.98	39.02
Woman's Education:	0.69	0.60
1 Secondary or more 0 Primary or no schooling		
Indigenous Woman	0.04	0.10
Partner's age	42.36	42.55
Partner's Education:	0.70	0.61
1 Secondary or more 0 Primary or no schooling		
Indigenous Partner	0.05	0.10
Children 18 years old or less:	0.51	0.55
1 Two or more 0 Otherwise		
Cohabiting couple	0.24	0.245
Number of times married	1.12	1.09
Remittances	0.03	0.04
Cash Transfers (PROSPERA)	0.11	0.20
Homicides per 100,000 inhabitants	18.43	18.46
Sex ratio (males to females)	100.95	105.51
Inequality (Gini coefficient)	0.47	0.48
Unilateral Divorce: 1 Yes 0 No	0.13	0.11
Rural: 1 Yes 0 No	0.18	0.24
Blows in your family of origin	0.27	0.30
You were beaten in your family of origin	0.36	0.39
Insults in your family of origin	0.28	0.31

Source: National Survey on Relationships within the Household (ENDIREH)

Table 3: FE Estimates: Effects of Economic Growth on Women's Empowerment (Personal Freedom)

	Work	Shopping	Visit Relatives	Buy things for you	Policy participation	Make friends	Freedom of vote	Personal freedom
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log (GDP Per Capita)	0.043*	0.047**	0.043**	0.062**	0.034	0.052**	0.123***	0.203***
	(0.022)	(0.021)	(0.020)	(0.023)	(0.021)	(0.022)	(0.034)	(0.073)
Female characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Partner/household	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State/Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.03	0.03	0.02	0.04	0.03	0.08	0.05	0.07
Observations	161638	179766	179462	177835	154647	170568	171981	132181

Note: Female characteristics include age, education, speak an indigenous language, number of times married, blows, beaten, and insults in her family of origin. Partner and household characteristics include partner's age, education, and speaking an indigenous language. In addition, children with 18 years old or less, number of times married, cohabiting, remittances, and cash transfers from PROSPERA. State characteristics include homicides per 100,000 inhabitants, sex ratio (males to females), inequality (Gini coefficient), unilateral divorce, and rural. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4: FE Estimates: Effects of Economic Growth on Women's Empowerment (Gender Roles)

	(1)	(2)	(3)	(4)
Log (GDP Per Capita)	0.062	-0.033***	0.005	0.022
	(0.047)	(0.011)	(0.019)	(0.076)
Female characteristics	Yes	Yes	Yes	Yes
Partner/household	Yes	Yes	Yes	Yes
State characteristics	Yes	Yes	Yes	Yes
State/Year FE	Yes	Yes	Yes	Yes
R^2	0.15	0.11	0.08	0.20
Observations	181832	181796	181672	181481

Note: column (1) refers to "man must take responsibility for all the expenses of the family"; column (2) refers to "a woman does not have the same capacity as a man to earn money"; (3) refers to "it is the wife's obligation to have sex with her husband even if she does not want"; and (4) refers to an index using principal components. Female characteristics include age, education, speak an indigenous language, number of times married, blows, beaten, and insults in her family of origin. Partner and household characteristics include partner's age, education, and speaking an indigenous language. In addition, children with 18 years old or less, number of times married, cohabiting, remittances, and cash transfers from PROSPERA. State characteristics include homicides per 100,000 inhabitants, sex ratio (males to females), inequality (Gini coefficient), unilateral divorce, and rural. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: FE Estimates: Effects of Economic Growth on Women's Empowerment (Household Decisions)

	(1)	(2)	(3)	(4)	(5)
Log (GDP Per Capita)	0.005	0.020***	0.013	0.013	0.050
	(0.011)	(0.005)	(0.010)	(0.010)	(0.031)
Female characteristics	Yes	Yes	Yes	Yes	Yes
Partner/household	Yes	Yes	Yes	Yes	Yes
State characteristics	Yes	Yes	Yes	Yes	Yes
State/Year FE	Yes	Yes	Yes	Yes	Yes
R^2	0.03	0.02	0.03	0.05	0.05
Observations	174237	181760	153446	176598	144353

Note: column (1) refers to "use the money you earn"; column (2) refers to "how the money is spent"; (3) refers to "permits for daughters and sons"; (4) refers to "having sex" and (5) refers to an index using principal components. Female characteristics include age, education, speak an indigenous language, number of times married, blows, beaten, and insults in her family of origin. Partner and household characteristics include partner's age, education, and speaking an indigenous language. In addition, children with 18 years old or less, cohabiting, remittances, and cash transfers from PROSPERA. State characteristics include homicides per 100,000 inhabitants, sex ratio (males to females), inequality (Gini coefficient), unilateral divorce, and rural. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Bounding Methodology: Effects of Economic Growth on Women's Empowerment

	Personal freedom	Male gender roles	Household decisions
	(a)	(b)	(c)
	$0 \leq \delta \leq 1$		
Log (GDP Per Capita)	[0.203, 40.037]	[0.022,83.617]	[-286.087,0.050]
	$-1 \leq \delta \leq 0$		
Log (GDP Per Capita)	[0.101, 0.203]	[-0.115,0.022]	[0.050,0.059]
Female characteristics	Yes	Yes	Yes
Partner/household	Yes	Yes	Yes
State characteristics	Yes	Yes	Yes
State/Year FE	Yes	Yes	Yes
Observations	132181	181481	144353

Note: Female characteristics include age, education, speak an indigenous language, number of times married, blows, beaten, and insults in her family of origin. Partner and household characteristics include partner's age, education, and speaking an indigenous language. In addition, children with 18 years old or less, cohabiting, remittances, and cash transfers from PROSPERA. State characteristics include homicides per 100,000 inhabitants, sex ratio (males to females), inequality (Gini coefficient), unilateral divorce, and rural.

Table 7: Lewbel's Instrumental Variables: Effects of Economic Growth on Women's Empowerment

	Personal freedom (a)	Male gender roles (b)	Household decisions (c)
Log (GDP Per Capita)	0.179***	0.031	0.035
	(0.063)	(0.082)	(0.031)
Female characteristics	Yes	Yes	Yes
Partner/household	Yes	Yes	Yes
State characteristics	Yes	Yes	Yes
State/Year FE	Yes	Yes	Yes
R^2	0.07	0.20	0.05
Observations	132181	181481	144353
F-statistic first stage	113	814	409

Note: Female characteristics include age, education, speak an indigenous language, number of times married, blows, beaten, and insults in her family of origin. Partner and household characteristics include partner's age, education, and speaking an indigenous language. In addition, children with 18 years old or less, cohabiting, remittances, and cash transfers from PROSPERA. State characteristics include homicides per 100,000 inhabitants, sex ratio (males to females), inequality (Gini coefficient), unilateral divorce, and rural. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Effects of Economic Growth on Personal Freedom by Economic Sector

	Personal freedom (a)	Personal freedom (b)
(Agriculture/GDP)*log(Agriculture GDP Per Capita)	0.0034 (0.0022)	0.0034 (0.0020)
(Industry/GDP)*log(Industry GDP Per Capita)	0.0019* (0.0010)	0.0019** (0.0007)
(Services /GDP)*log(Services GDP Per Capita)	0.0018 (0.0012)	0.0018* (0.0010)
State/Year FE	Yes	Yes
Female characteristics	No	Yes
Partner/household	No	Yes
State characteristics	No	Yes
R^2	0.05	0.07
Observations	132970	132181

Note: Female characteristics include age, education, speak an indigenous language, number of times married, blows, beaten, and insults in her family of origin. Partner and household characteristics include partner's age, education, and speaking an indigenous language. In addition, children with 18 years old or less, number of times married, cohabiting, remittances, and cash transfers from PROSPERA. State characteristics include homicides per 100,000 inhabitants, sex ratio (males to females), inequality (Gini coefficient), unilateral divorce, and rural. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Heterogeneous Effects of Economic Growth on Women's Empowerment with respect to Education, Indigenous, and Number of Children

	(a)	(b)	(c)	(d)
Panel A: Personal freedom				
Log (GDP Per Capita)	0.193**	0.192**	0.188**	0.196**
	(0.071)	(0.072)	(0.072)	(0.074)
Log (GDP Per Capita) × Woman's Education: 1 Secondary or more 0 Primary or no schooling	-0.002			
	(0.012)			
Log (GDP Per Capita) × Woman's Age: 1 15-25 years 0 26-60 years		0.001		
		(0.016)		
Log (GDP Per Capita) × Indigenous Woman			0.042**	
			(0.017)	
Log (GDP Per Capita) × Children less 20 years old: 1 Two or more 0 Otherwise				-0.006
				(0.010)
Panel B: Male gender roles				
Log (GDP Per Capita)	-0.002	0.017	0.022	0.014
	(0.062)	(0.078)	(0.079)	(0.077)
Log (GDP Per Capita) × Woman's Education: 1 Secondary or more 0 Primary or no schooling	0.071*			
	(0.040)			
Log (GDP Per Capita) × Woman's Age: 1 15-25 years 0 26-60 years		0.006		
		(0.020)		
Log (GDP Per Capita) × Indigenous Woman			-0.036	
			(0.025)	
Log (GDP Per Capita) × Children less 20 years old: 1 Two or more 0 Otherwise				0.006
				(0.008)
Panel C: Household decisions				
Log (GDP Per Capita)	0.061*	0.053	0.032	0.046
	(0.031)	(0.032)	(0.032)	(0.033)
Log (GDP Per Capita) × Woman's Education: 1 Secondary or more 0 Primary or no schooling	-0.032**			
	(0.012)			
Log (GDP Per Capita) × Woman's Age: 1 15-25 years 0 26-60 years		-0.022		
		(0.035)		
Log (GDP Per Capita) × Indigenous Woman			0.160**	
			(0.059)	
Log (GDP Per Capita) × Children less 20 years old: 1 Two or more 0 Otherwise				0.007
				(0.017)
Female characteristics	Yes	Yes	Yes	Yes
Partner/household	Yes	Yes	Yes	Yes
State characteristics	Yes	Yes	Yes	Yes
State/Year FE	Yes	Yes	Yes	Yes

Note: Female characteristics include age, education, speak an indigenous language, number of times married, blows, beaten, and insults in her family of origin. Partner and household characteristics include partner's age, education, and speaking an indigenous language. In addition, children with 18 years old or less, number of times married, cohabiting, remittances, and cash transfers from PROSPERA. State characteristics include homicides per 100,000 inhabitants, sex ratio (males to females), inequality (Gini coefficient), unilateral divorce, and rural. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$