VNU Journal of Science: Policy and Management Studies, Vol. 40, No. 4 (2024) 83-94

VNU Journal of Science: Policy and Management Studies

Journal homepage: https://js.vnu.edu.vn/PaM

Original Article

Income Growth and Industrial Landscape: Examining Mexican Household Survey Data

Do Thi Thuy Linh[1], Steven Archambault[2], Pham Hoang Linh[3,*]

[1]*Thai Nguyen University of Economics and Business Administration, Vietnam*

[2] *Agribusiness & Food Industry Management, Cal Poly Pomona University, USA*

[3] *VNU University of Economics and Business, Vietnam National University, Hanoi, Vietnam*

Received 15 May 2024
Revised 22 September 2024; Accepted 17 December 2024

Abstract: This research explores the economic impact of the existence of industrial sectors throughout communities in Mexico. Of particular interest is the role of maquiladora based industries, or those sectors that import materials and equipment which are then assembled, processed and manufactured into export products. The latest updated data used in the study is from Mexican Family Life Survey managed by Iberoamerican University with other partners. The nationwide household panel data was collected in three waves from 2002 to 2012, with about 8,500 households and 150 communities surveyed. The data is analyzed with the fixed effects regression approach. Results indicate that the presence of maquiladoras in the community has a negative and significant impact on the growth of household income. Of its two parts, the existence of manufacturing facilities has a significantly negative relationship with the growth of household income while assembly plants existence does not have a statistically significant impact. Other variables that indicate robust evidence of importance include the number of people in the household, the number of schools per person in the communities, and the land area per person in the household. Education of the head of household has some positive impacts on household income growth, but the results are not robust.

Keywords: Mexico, maquiladoras, household income, Mexican Household Life Survey (MxFLS).

1. Introduction

There are a number of studies on the relationship between industrial factories and income or income per capita at the multi-national, national or state level, but studies on that relationship at the household and community level are limited. One of the reasons

* Corresponding author.
E-mail address: phamhoanglinh@vnu.edu.vn

https://doi.org/10.25073/2588-1116/vnupam.4263

is the data at this level is difficult to obtain. This is also the problem for studies on the impacts of maquiladora industries in Mexico.

A maquiladora is a foreign owned manufacturing facility that imports duty-free materials and components for assembly, processing, or manufacturing and then exports the final products to the owner's country. In Mexico, the maquiladoras are mostly American-owned factories that manufacture and assemble products to export to the U.S. markets. Though the Mexico's Maquiladora Program was initiated back in 1964, it was not until the North American Free Trade Agreement (NAFTA) approved in 1994 did the maquiladora industry in Mexico really explode. Most of the first maquiladora factories were along the U.S - Mexico border, but now they have spread throughout Mexico. Mexico was the United States' second largest export market and the second largest supplier of imports in 2022 [1]. The U.S. foreign investment has contributed greatly to the establishment and development of maquiladoras in Mexico. According to the U.S. Department of State (2023), the U.S. is the largest foreign investor in Mexico, accounting for 50% of all FDI [2].

Maquiladoras have been the main economic driver which has considerably improved the Mexico's competitiveness in the global economy. Mexico is the 12th largest exporter in the world and manufactured products are its main exports accounting for above eighty percent of total shipments [3]. However, the comparison between the costs and benefits of maquiladora industries is still controversial; some argue the costs outweigh the benefits whereas the others state the reverse.

Many academics have shown some crucial maquiladora related problems that might alarm the sustainability of Mexican economic development. The expansion and thriving of the maquiladora sector during the peso crisis and depression of 1994-1995 actually exacerbated the degree of inequality and poverty in Mexico [4]. Based on a survey of 177 maquiladora workers, Takaro et al., (1999) state that transnational corporations are ignoring Mexican regulations on hazards, training, health and safety commitment [5] Not only do the employees in maquiladora factories suffer from miserable working conditions, they – especially female Mexican laborers – are exploited doing hard and hazardous work for some monetary gains [6-9]. Maquiladoras have contributed towards environmental contamination and increased health risks of families in northern Mexican states [10, 11]. These issues raise the concern that maquiladoras have created more costs than benefits.

On the other hand, the arguments of supporters of the maquiladora industry are based on the benefits of a higher export position, more employment and higher wages. The existence of maquiladoras enhances the process of industrialization [12], especially in rural areas where the land is taken away from households and they must struggle to maintain adequate income levels. Maquiladora plants have filled some of that employment gap by providing off-farm work [13]. Many studies show that maquiladoras in Mexico have positive impacts on the relative wages and employment of skilled and unskilled workers, especially in the regions with high exposure to global economy such as the border states [14-17]. The data used in these studies is either at the state or industry level, and focus on the U.S - Mexico border. Furthermore, some of the studies are dated back decades ago.

This study makes some contribution to the literature by concentrating on the impacts of the maquiladora based industries on Mexican the growth of household incomes at the household and community levels. The Mexican Family Life Survey (MxFLS) data[1] is used because of two main important reasons. First, it is the longitudinal survey with the ten-year information during the period 2002 – 2012. As the data is collected through three survey rounds

[1] For further information, please visit its website through the link https://www.ennvih-mxfls.org/english/ and the link for reference is, https://gero.usc.edu/cbph/network/studies-with-biomarkers/the-mexican-family-life-survey-mxfls/

with almost the same base of respondents, it is possible to keep track of the respondents' behaviors and outcomes dynamically. It is noticeable that the survey has 3 rounds and finished in 2012. From that time one, no more round has been carried out. Therefore, the data includes only the period from 2002 to 2012. Though the data has not been updated uptill now, the suggestions from this research might be refered to as the lessons for other countries in the current time. Second, the survey contains information of three levels – individuals, households and communities. As the source is identical for three levels, it is expected to limit the problems that occur when combining multiple data sources such as consistency and logical compatibility. Therefore, the data can reveal some significant results on the real relationships between variables with fewer biases.

While our main interest is focused on the relationship between maquiladoras and the growth of household incomes, there are many other factors affecting the flows of income to households. Household incomes can be conceptualized as the sum of income and revenues from wages, business, agricultural activities, retirement pension, subsidies from government and other income like rent earnings [18]. In this sense, education which influences the level of labor knowledge and skills is considered to have positive impacts on household income [19-23]. Furthermore, education is related to types of employment which is also an essential determinant of household income in both urban and rural areas. People who engage in off-farm activities can earn higher income levels than those doing the farm work [18]. Household size, especially the number of adults employed, is statistically significant and positive determinant of rural household income [21, 24]. Other key factors affecting household incomes include remittance from migrant workers in households [22, 25], agricultural potential [23, 26], private and public assets [20, 27].

While literature finds some positive impacts of the existence of export-oriented manufacturing industries on household income, these studies usually use either primary data with a small number of respondents or secondary data at state level. Kabeer and Mahmud (2004) use the data from a survey of 1322 women workers and their households carried out in 2001, and find that in the Bangladeshi ready-made garment manufacturing, workers in export processing zones can earn the highest mean annual household income compared to those in domestic garment factories and other self-employed or wage workers [28]. According to Zimmer and Guzman (2012), manufacturing maintains workers' salaries at a high level and promotes the well-being of the state's middle class. They use the state level data from the U.S. Census Bureau, the Bureau of Labor Statistics and the Bureau of Economic Analysis during the period 1997 – 2010 to run the autoregressive model for every state. In general, the results are statistically significant and show that an increase in manufacturing as a percent of state gross domestic product will raise the median household income. Then, the question is whether the similar relationship exists in Mexico using the secondary survey data at household and community levels [29].

There are also some studies on the determinants of household income in Mexico, but they do not focus on the importance of the existence of maquiladora factories in the community. De Janvry and Sadoulet (2000) analyze the 1997 data set for the Mexican ejido – the especially poor smallholders benefited by the Mexican land reform, and claim that household asset endowments, and the institutional, social and geographical context are key determinants of rural incomes. Particularly, results show that access to land, human assets (the number of adults and average level of adult education in the household) create large income effects. Minority ethnic groups, which are common in rural Mexico, have lower incomes. Access to credit and technical assistance makes high contributions to agricultural income. In addition, regional effects show that households in the Centre are differentially poorer than those

in the North; and migration to the United States generates remittance income which is also an important source of income. Finally, rural education is most valued in non-agricultural labor markets, but has a negative role on agricultural wage income and remittance income [30]. De Janvry and Sadoulet (2001) affirm that off-farm activities account for more than half of total income of ejidatario households. They find some evidence that participation in nonagricultural employment depends on the educational levels and the regional availability of the work. Moreover, indigenous adults have less access to off-farm employment than non-indigenous ones; and proximity to urban centers tends to enhance women to gain off-farm employment [31]. The importance of education in enabling rural households in Mexico to access to nonagricultural employment is also found in the research by Yúnez-Naude and Taylor (2001) [32].

To the best of our knowledge, of the limited number of Mexican maquiladoras related researches using MxFLS data, they usually focus on migration and health issues [33-36]. Therefore, this study which uses the MxFLS data to identify how the existence of maquiladora based industries in the community affects the income level of Mexican households displays the usefulness of MxFLS data for different research purposes. In the following, Data and Methodology section describes in more details the data and the regression model; Results section demonstrates both descriptive and statistical outcomes; and Conclusions section accomplishes the main findings and some policy implications.

2. Data and Methodology

This study uses the data from the Mexican Family Life Survey (MxFLS) which is a longitudinal, multi-thematic survey of the Mexican population at the individual, household and community level. This is the most recent and comprehensive dataset on this topic in Mexico. The survey is carried out in three rounds 2002, 2005-2006 and 2009-2012 which are treated as three study time periods. The baseline survey (MxFLS-1) was conducted in 2002 with the sample of 8,441 households in 150 communities from 16 selected states [37]. The second (MxFLS-2) and third (MxFLS-3) during the period 2005-2006 and 2009-2012 respectively relocated and re-interviewed almost 90 percent of the original sampled households [38, 39]. In particular, they include those individuals who migrated within Mexico or emigrated to the United States of America, and interview the individuals or households that grew out from previous samples. Since the data is collected through a cooperative project among research centers in Spain and in the United States who simply state the sample without clarifying the population and the formula for identifying the sample, we can just make use of the data as it is given.

In this study, annual income per capita and its growth are used as the main measures of household welfare. According to the MxFLS survey, the gross household income comes from any of the three sources that are employment, non-labor income and rural income. Employment income includes wage or salary, piecework, commissions and tips, extra hours, bonuses, medical benefits, etc. but the main sources are from annual salary or wage from main and secondary jobs and business. Employment income information is collected for both interviewed and not interviewed members. Non-labor income consists of subsidies or governmental aid, education scholarships or donations, pension, life insurance, inheritance, property sales, etc. Rural income is earned from the sale of agricultural products. Income per capita is calculated by dividing the gross household income by the household size that is the total number of household members.

In order to explore the economic development impact of industrial sectors throughout communities in Mexico, we try to figure out how the income per capita and its growth are explained by the existence of industrial facilities in the areas, especially the manufacturing and assembly factories. Since

there are many other factors affecting the growth of income per capita and they can have an important influence on the regression outcomes, it is essential to control those factors. In this study, the control variables include the number of people in the household, the number of schools per person in the communities, the land area per person in the household, and education level of the household head.

The data set contains observations at both household level and community level. The combination of data at different level is done based on the location identifier that identifies a household is located at which community. It is noticeable that the data at community level may contain many observations for one survey question because of the distinction in sequences (secuencia) or types of informants (tipo). There are two types of informants that are official and unofficial; and about ten levels of sequences who are in charge of different positions in the community administration including the municipal president, any other authority of the town, any other leader of the community, etc. In case there are overlaps in the answers of different secuencia and tipo, the official tipo and secuencia are selected as the filter to ensure only one answer for each survey question.

The data is analysed with panel data approach using STATA statistical software. We regress the data of three separate time periods corresponding to the three rounds 2002, 2005-2006 and 2009-2012. However, as the samples do not disclose how the income per capita change over time, we use the data in 2002 as the base to calculate the changes in variables. In this sense, samples in the second and third survey waves are treated as two study times. In general, the regression model is as followed:

$$ICP_{it} = \beta_0 + \beta_1 MA_{it} + \sum_{j=2}^{n} \beta_j CON_{it} + \mu_{it}$$

Where: ICP is the change of income per capita; MA is the existence of manufacturing and/or assembly facilities in the community; CON are control variables which include the number of people in the household, the number of schools per person in the communities, the land area per person in the household, the education of the head of household; μ_{it} are error terms.

The final notice is the impact of inflation which is very important for creating the panel data set. 2009 is selected as the base year for calculation, so monetary values that are in Mexican peso (MXN) are inflation adjusted into 2009 MXN. In particular, according to the Bureau of Statistics, the inflation rate in Mexico from June 2002 to June 2009 was 36.24% which means that one MXN at the time of year 2002 has the value equivalent to 1.3624 MXN in year 2009. During the period June 2005 and June 2009, as the inflation rate was 19.3%, so the value of one MXN in 2005 is equal to 1.193 MXN in 2009. When combining samples from three survey rounds, all monetary values in 2002 are multiplied with 1.3624 and all those in 2005 are multiplied with 1.193.

3. Results

3.1 Descriptive Statistics

Table 1 describes the variables in the panel data set which combines both household and community level data in two study periods 2005 – 2006 and 2009 – 2012. The data in the survey wave one (in year 2002) is used as the base to calculate the growth in per capita income (PINC). It is the change in net income divided by the net income in the previous survey wave. The dummy variable YR2005 distinguishes if the data is collected in the second wave (in year 2005 – 2006) or in the third wave (in year 2009 – 2012). Because of the exclusion of the first wave data and the missing data, the total number of observations considerably reduces in order to make the data balanced.

EDU shows the highest level of schooling the household heads ever attended. In the survey, education attendance is categorized into 10 levels. They are without instruction, preschool or kinder, elementary, secondary, open secondary, high school, open high school, normal basic,

college, and graduate. As the dummy variable, EDU equal to 0 means that the heads of the households have not graduated from high school; and EDU equal to 1 means that the heads of the households are at least high school graduates.

In the survey, schools are classified into many categories. They are elementary, distance education, junior high schools, high schools, distance high schools, Conalep schools, farming technological centers, technological/industrial/services educational centers (CETIS), farming technological high school centers (CBTA), technological/industrial/services high schools (CBTIS) and universities/technological institutes. The variable SCHOOL counts number of all these schools in a community divided by the population in that community.

Due to the limitation of the data, we do not know the exact number of factories by industry in the communities. The only information given is the existence of an industry in a community. Types of industry are classified into 12 categories. 12 types of industries in MxFLS data are: 01. Agriculture; 02. Cattle (including forestry, hunting and fishing); 03. Metallurgy; 04. Mining (including excavation); 05. Manufacturing industry (textile, automotive, wood, plastic, etc.); 06. Assembly plant; 07. Electricity, gas, water and petroleum; 08. Construction; 09. Wholesale and retail commerce, restaurants and hotels; 10. Transportation, storage and media; 11. Finances, insuring, building renting, commerce services and transport; 12. Social services.

If a community has manufacturing plants, MANUF is equal to 1. If a community has assembly plants, ASSEM equals to 1. If a community has either manufacturing or assembly plants, it is considered to have a maquiladora industry (MAQUILA = 1). A community has a high industry diversity if it has at least two types of industry existing in the area.

Land is not only a valuable asset to households, but also an important input of production. It can be used for businesses to increase income; therefore, it is expected to have considerable impacts on income and income growth. As we are considering the per capita values, the area of land owned by a household is divided by the number of people in the household (LANDPP variable). Table 1 shows that the largest land area owned by a person is 6,833.333 hectares; and the average land area per person is 4.551 hectares.

Table 1. Data Descriptive Statistics

Variable		N	Mean	Stdev	Min	Max
Pinc	The growth in per capita income (measured in %).	12132	7121.620	117317.400	-1	1.24E+07
Hhsize	The number of people in the household.	12132	2.873	1.471	1	13
Edu	A dummy variable for the head of household education; 1=Education above level 5 (high school); 0=Education below level 5.	12132	0.184	0.387	0	1
School	A count of the number of schools per person in the communities.	12132	1.773	13.096	0	306
Yr2005	A dummy variable for data collected in the second wave. 1=It is data collected in wave two; 0=Wave 3.	12132	0.500	0.500	0	1
Manuf	Dummy variable representing the presence of an assembly facility in the community; 1=Manufacturing facility	12132	0.284	0.451	0	1

	is present, 0=Manufacturing Not Present.					
Assem	Dummy variable representing the presence of an assembly facility in the community; 1=Assembly facility is present, 0=Assembly Not Present.	12132	0.207	0.405	0	1
Maquila	Dummy variable representing the presence of assembly and manufacturing operations in the community; 1=ASSEM or MANUF present; 0=Neither present.	12132	0.332	0.471	0	1
Divind	A measure of industry diversity in each community (a summation of dummy variables for 12 industry sectors 1=One Sector Present, 12=All Sectors Present.	12132	0.001	0.002	0	0.014
Landpp	Land area per person in the household (hectares).	12132	4.551	124.645	0	6833.333
Incpp	Household income per person (2009 Pesos).	12132	26263.220	176167.600	0	1.48E+07

Table 2. Correlation Coefficients between Variables

	Hhsize	Edu	School	Yr2005	Divind	Landpp	Incpp	Manuf	Assem	Maquila
Hhsize	1									
Edu	-0.0601	1								
School	-0.0288	0.0348	1							
Yr2005	-0.0316	-0.0313	-0.0133	1						
Divind	-0.0411	0.1362	0.0159	-0.0201	1					
Landpp	0.0166	-0.003	-0.0014	-0.0208	-0.0111	1				
Incpp	-0.0316	0.0729	0.0058	0.0055	0.1523	-0.0008	1			
Manuf	-0.0272	-0.0086	-0.0032	-0.0426	0.03	-0.0017	0.0104	1		
Assem	-0.0273	0.1129	-0.037	0.0387	0.6043	-0.0173	0.1762	-0.0382	1	
Maquila	-0.0271	0.1255	-0.0096	-0.048	0.687	-0.0137	0.1423	0.029	0.5733	1

Table 2 shows most of the variables have rather small and acceptable correlation (less than 30%). However, there is a strong correlation between assembly and maquiladora industries (57.33%); and they also have high correlation coefficients with industry diversity in the community (60.43% and 68.7%, respectively). One of the reasons is the main functions of maquiladoras are assembling, processing and manufacturing imported components to export. It also reflects the fact that industrial factories usually cluster to take advantage of proximity such as labor supply, support services, suppliers and distributors, etc. That fact is especially true for the industrial zones or export processing zones where the businesses can even share the benefits of low tax rates and other subsidies from the local government. In the following section, we run different regression models to identify the separate impacts of the existence of manufacturing, assembly and industry diversity on the growth of income per capita.

3.2. Regression Results

As the data is collected in both border and non-border states, panel regressions with fixed effects are used to ensure variables are time independent. The dependent variable in all models is the growth of income, which is the natural log of income over years. Because the raw data is limited in three rounds, the growth of income exists for 2005 and 2009 data only; and year 2005 is selected as the dummy variable. Due to the missing data and missing weights, the total observations go down to 12,130. That is each household has two observations of income growth for 2005 and 2009 data.

In model one, the main variable of interest is MAQUILA; and a group of variables is included to grasp any significant impacts on the growth of household income. Per capita income is included as an important independent variable because it is expected that a household with existing high per capita income is likely to enjoy a higher rise in income.

The second model is the same as the first one, but the instrumental variables are used to identify if the explanatory variables plausibly have the causal relationships with the dependent variable. The reason we need this model is because it is very likely that per capita income is influenced by the variables that influence income growth. A set of variables including the percentage of adults in households, the percentage of income that comes from farming are considered to be suitable instruments because they might only affect household income growth through per capita income. The Hansen J measures and Endow tests show that the instruments are valid and exogenous.

The results are demonstrated in Table 3. It shows that the coefficients are relatively consistent, with or without the method of instrumental variables. The existence of maquiladora industry in the community has statistically negative impacts on the growth of household income. In particular, the model 1 and model 2 show that the existence of maquiladora industry decreases household income growth by 8, 114.8 percent and 6,435.1 percent, respectively. An increase by one peso in income per capita leads to leads to less than 1 percent increase in the growth of household income. An increase of one member in a household statistically and significantly results in the increase in household income growth by 4,623.6 percent in model 1 and by 6,055.6 percent in model 2. The negative signs of the dummy variable YR2005 in both models show the significant decreases in the growth of household income in this survey wave compared to the survey round in 2009 – 2012. Three explanatory variables that do not have statistically significant impacts on the growth of household's income are education of the head of household, the number of schools per person in the communities, and land area per person in the household.

Table 3. Panel regression, with income growth (PINC) as a dependent variable[a.]

Dependent Variable: PINC	(1)	(2)	(3)	(4)
	PANEL-FE	PANEL FE-IV	PANEL-FE	PANEL FE
Independent Variables[b.]				
YR2005	-3462.9**	-4362.2***	-3627.5***	-3575.2**
	(1500.501)	(1511.034)	(1375.115)	(1593.464)
INCPP	0.452*	0.578***	0.452*	0.452*
	(0.260)	(0.153)	(0.260)	(0.260)
HHSIZE	4623.6**	6055.6***	4642.5**	4716.4***
	(1827.644)	(1896.677)	(1821.703)	(1816.144)

LANDPP	-1.090	-1.551	-0.985	-0.677
	(1.527)	(1.631)	(1.531)	(1.489)
SCHOOL	619.8	809.0	606.4	636.3
	(518.653)	(805.852)	(520.638)	(525.671)
EDU	4273.2	4099.0	4368.0*	-637.6
	(2608.739)	(2865.895)	(2637.176)	(3568.048)
MAQUILA	-8114.8**	-6435.1*		
	(3382.285)	(3727.462)		
ASSEM			-3550.6	
			(3728.189)	
MANUF			-7790.3**	
			(3381.795)	
DIVIND				-1128.4*
				(660.252)
N	12130	12020	12130	12130
Households	6065	6010	6065	6065
R^2	0.5125	0.4737	0.5126	0.5120
AIC[c]	293669.2	302960.3	304660.4	304665.5
Hansen J [d]	0	4.407	0	0
Endog [e.]		0.024		

[a.] Robust standard errors are in parentheses. * significant at 10%, ** significant at 5%, ***significant at 1%.

[b.] YR2005 is a dummy variable for data collected in the second phase; INCPP is household income per person; HHSIZE is the number of people in the household; LANDPP is the number of hectares owned per person in the household; SCHOOL is a dummy variable for the number of schools per person in the communities; EDU is a count of the head of household education (above level 5). MAQUILA is a dummy variable representing the presence of assembly and manufacturing operations in the community ASSEM is a dummy variable representing the presence of an assembly facility in the community. MANUF is a dummy variable representing the presence of a manufacturing facility in the community. DIVIND is a measure of the diversity of industry in the community.

[c] AIC: Goodness-of-fit measure considering the trade-offs between accuracy and complexity. A lower value indicates a preferred model.

[d.] Hansen J: Over identification test, with the null that instruments are over identified and valid.

[e.] Endog (chi-sq): Tests exogeneity of the questioned explanatory variable, with the null hypothesis that the variable is exogenous. The null is not rejected.

As our set of explanatory variables are not endogenous, we are confident to take a deeper look at the components of maquiladoras to see which one statistically contributes to the overall negative impacts on the growth of household income. In model 3, we break MAQUILA into its parts, ASSEM and MANUF. The results show that it is the existence of manufacturing plants in the communities that statistically and significantly reduces the household income growth by 7,790.3 percent. Assembly plants do not have statistically significant impacts on the growth of household income. The coefficients of most of the explanatory variables, including the number of people in the household, the number of schools per person in the communities, land area per person in the household, and the dummy, hold the similar signs as in the two

previous models with not many changes in the absolute values. This is the evidence that the results are robust. The only exception is education of the head of household which becomes statistically significant in model 3. It has a positive impact, at 10 percent significance level, on the growth of household income. This means that if a household head has at least high school graduation, the household's income should increase by 4,368.0 percent.

In the last model, we add an index to try to capture how diverse each community is in its sectors. The result shows that an increase in the industry diversity in the community by one sector statistically and significantly reduces the growth of local household income by 1,128.4 percent. This negative impact of all industries in a community is consistent with the impact of maquiladoras. It is noticeable that in this model, education of the head of household becomes insignificant again while the other variables are still robust with the results from the previous models.

AIC is a goodness of fit measure; a lower measure suggests a better model. Both AIC and R-squared show the regression lines fit the real data relatively well. It can be seen that the independent variables used in the regression models could explain about 50 percent of the changes in the growth of household's income. Moreover, the values of R-squared are rather consistent over the four models.

4. Conclusions

The regression results from the four models are robust, except the education of the head of household. They show consistently that the existence of maquiladoras doesn't help with the growth in household income; neither does the existence of any other industries in the communities. The results seem to contrast with the conventional thought on the importance of the existence of industrial plants in the community towards the growth of household income in the area. This research demonstrates the importance of rethinking the Mexican policies towards attracting maquladoras into the country during the study period. Though the data is not updated, the finding also signifies the other developing countries that are pursuing the similar policies to have more research on the impacts of maquiladoras on domestic people's income. If it has positive impacts, it is worth keeping the policies. Otherwise, the national resources should be used more effectively in other channels of economic development.

The negative relationships found based on the given available data might be significantly biased due to the supports and assistances from the government. There are some households who report exceptionally huge increases or decreases in the net income over the survey time. The typing errors and reporting mistakes are not excluded from the main reasons for the strange results. There might be considerable changes in the results if the data on the number of industrial plants in the community is available. For the future research, it is better if we have a more relevant set of data. Or it is possible to use the current data to find the possible relationships between the existence of an industry in the community and the local household income.

One of the limitations of this study is that we could not control the mobility of households who in-migrate into or out-migrate from the surveyed communities. As a result, many observations are deleted because of the missing data. The other limitation is the exclusion of weights in the regression models. Though this exclusion of weights causes the statistics to fail to represent the population, it makes the data less instable. Hence, if someone is willing to trade-off stability for representativeness, he or she is advised to include weights into the models.

It is highly recommended that the data should be updated and the above limitations are solved. Despite those shortcomings, the efforts of making a longitudinal, multi-thematic survey of the Mexican population at all levels are highly appreciated. This can be refered to as an important source for the other developing coutries to make the like survey to determine the impacts of foreign owned manufacturing

facilities on the development of the domestic economies.

References

[1] U. S. Trade Representative, Countries and Regions, https://ustr.gov/countries-regions#:~:text=The%20top%20five%20suppliers%20of,and%20Germany%20(%24146.6%20billion, 2022 (accessed on: May 14th, 2024).

[2] U. S. Department of State, 2023 Investment Climate Statements: Mexico, https://www.state.gov/reports/2023-investment-climate-statements/mexico/#:~:text=The%20United%20States%20is%20Mexico's,Investment%20Survey%2C%20table%203, 2023 (accessed on: May 13rd, 2024).

[3] Central Intelligence Agency, Country Comparison: Exports, The World Factbook, https://www.cia.gov/library/publications/resources/the-world-factbook/geos/mx.html, 2016 (accessed on: May 13rd, 2024).

[4] P. Cooney, The Mexican Crisis and the Maquiladora Boom: A Paradox of Development or the Logic of Neoliberalism?, Latin American Perspectives, Vol. 28, No. 3, 2001, pp. 55-83.

[5] T. K. Takaro, G. A. Michele, D. B. Garrett, G. B. Simone, B. K. Elizabeth, Community-based Survey of Maquiladora Workers in Tijuana and Tecate, Mexico, International Journal of Occupational and Environmental Health, Vol. 5, No. 4, 1999, pp. 313-315.

[6] E. Fussell, Making Labor Flexible: The Recomposition of Tijuana's Maquiladora Female Labor Force, Feminist Economics, Vol. 6, No. 3, 2000, pp. 59-79.

[7] L. M. González, Wage Inequality and the Gender Wage Gap in Mexico, Economia Mexicana Nueva Epoca, Vol. 10, No. 2, 2001, pp. 291-323.

[8] K. Kopinak, Gender as a Vehicle for the Subordination of Women Maquiladora Workers in Mexico, Latin American Perspectives, Vol. 22, No. 1, 1995, pp. 30-48.

[9] M. Rendall, Structural Change in Developing Countries: Has it Decreased Gender Inequality?, World Development, Vol. 45, 2013, pp. 1-16.

[10] S. E. Grineski, W. C Timothy, Exploring Patterns of Environmental Injustice in the Global South: Maquiladoras in Ciudad Juárez, Mexico, Population and Environment, Vol. 29, 2008, pp. 247-270.

[11] S. E. Grineski, W. C. Timothy, M. L. R. Aguilar, Environmental Injustice Along the US–Mexico Border: Residential Proximity to Industrial Parks in Tijuana, Mexico, Environmental Research Letters, Vol. 10, No. 9, 2015, pp. 095012.

[12] J. A. Hart, Maquiladorization as a Global Process, J. A. Hart, Foreign Direct Investment in a Changing Global Political Economy, London, 2016, pp. 25.

[13] S. Polaski, Jobs, Wages, and Household Income, NAFTA's Promise and Reality: Lessons from Mexico for the Hemisphere, Vol. 11, 2003.

[14] J. Cañas, C. Roberto, W. G. Robert, S. Eduardo, The Impact of the Maquiladora Industry on US Border Cities, Growth and Change, Vol. 44, No. 3, 2013, pp. 415.

[15] R. C. Feenstra, H. H. Gordon, Foreign Direct Investment and Relative Wages: Evidence from Mexico's Maquiladoras, Journal of International Economics, Vol. 42, No. 3, 1997, pp. 371-393.

[16] G. H. Hanson, US-Mexico Integration and Regional Economics: Evidence from Border-city Pair, Journal of Urban Economics, Vol. 50, No. 2, 2001, pp. 259-287.

[17] G. H. Hanson, Globalization, Labor Income, and Poverty in Mexico, Globalization and Poverty, University of Chicago Press, 2007.

[18] B. Su, H. Almas, Analysis of the Determinants of Income and Income Gap between Urban and Rural China, China Economic Policy Review, Vol. 2, No. 1, 2013, pp. 1350002.

[19] R. Badiani, Factories and Farms: How does Economic Growth Impact Rural Incomes and Education?, Growth, Vol. 31, No. 1, 2010.

[20] J. Escobal, The Determinants of Nonfarm Income Diversification in Rural Peru, World Development, Vol. 29, No. 3, 2001, pp. 497-508.

[21] D. Miles, A Household Level Study of the Determinants of Incomes and Consumption, The Economic Journal, Vol. 440, No. 107, 1997, pp. 1-25.

[22] V. O. Pede, S. L. Joyce, R. P. Thelma, D. M. Justin, Determinants of Household Income: A Quantile Regression Approach for Four Rice-Producing Areas in the Philippines, Asian Journal of Agriculture and Development, Vol. 9, No. 2, 2012, pp. 65-76.

[23] A. Sarah, Determinants of Rural Household Income Diversification in Senegal and Kenya, SFER, 2012.

[24] D. Talukder, Assessing Determinants of Income of Rural Households in Bangladesh: A Regression

Analysis, Journal of Applied Economics & Business Research, Vol. 4, No. 2, 2014, pp. 80-106.

[25] J. Itzigsohn, Migrant Remittances, Labor Markets, and Household Strategies: A Comparative Analysis of Low-income Household Strategies in the Caribbean Basin, Social Forces, Vol. 74, No. 2, 1995, pp. 633-655.

[26] D. L. Tschirley, T. W. Michael, Food Security Strategies under Extremely Adverse Conditions: The Determinants of Household Income and Consumption in Rural Mozambique, World Development, Vol. 22, No. 2, 1994, pp. 159-173.

[27] D. Narayan, P. Lant, Cents and Sociability: Household Income and Social Capital in Rural Tanzania, Economic Development and Cultural Change, Vol. 47, No. 4, 1999, pp. 871-897.

[28] N. Kabeer, M. Simeen, Globalization, Gender and Poverty: Bangladeshi Women Workers in Export and Local Markets, Journal of International Development, Vol. 16, No. 1, 2004, pp. 93-109.

[29] T. E. Zimmer, D. A. Guzman, Manufacturing's Impact on Household Income and the Middle Class, Indiana Business Research Center at IU's Kelley School of Business, Vol. 13, No. 6, 2012.

[30] A. D. Janvry, S. Elisabeth, Rural Poverty in Latin America: Determinants and Exit Paths, Food Policy, Vol. 25, No, 4, 2000, pp. 389-409.

[31] A. D. Janvry, S. Elisabeth, Income Strategies among Rural Households in Mexico: The Role of off-farm Activities, World Development, D. Atkin, Working for the Future: Female Factory Work and Child Health in Mexico, Unpublished Manuscript, Yale University, Vol. 29, No. 3, 2001, pp. 467-480.

[32] A. Y. Naude, J. E. Taylor, The Determinants of Nonfarm Activities and Incomes of Rural Households in Mexico, with Emphasis on Education, World Development, Vol. 29, No. 3, 2001, pp. 561-572.

[33] D. Atkin, Working for the Future: Female Factory Work and Child Health in Mexico, Unpublished Manuscript, Yale University, 2009.

[34] K. Majlesi, N. Gaia, International Import Competition and the Decision to Migrate: Evidence from Mexico, Working Paper/Department of Economics, School of Economics and Management, Lund University, 2015, pp. 25.

[35] J. N. Martinez, Beyond Networks: Health, Crime, and Migration in Mexico, International Journal of Population Research, 2014.

[36] A. Villarreal, R. H. Erin, Rush to the Border? Market Liberalization and Urban-and Rural-origin Internal Migration in Mexico, Social Science Research, Vol. 41, No. 5, 2012, pp. 1275-1291.

[37] MxFLS-1: L. Rubalcava, G. Teruel, Mexican Family Life Survey, First Wave, Working Paper, https://www.ennvih-mxfls.org, 2006 (accessed on: May 13rd, 2024).

[38] MxFLS-2: L. Rubalcava, G. Teruel, Mexican Family Life Survey, Second Wave, Working Paper, https://www.ennvih-mxfls.org, 2008 (accessed on: May 13rd, 2024).

[39] MxFLS-3: L. Rubalcava, G. Teruel, Mexican Family Life Survey, Third Wave, Working Paper, https://www.ennvih-mxfls.org, 2013 (accessed on: May 13rd, 2024).