Rebuilding the economy

Economic Policies for Recovery and Development

Antonio Ruiz Porras

Coordinator

Rebuilding The Economy: Economic Policies for Recovery and Development

Rebuilding The Economy: Economic Policies for Recovery and Development

Coordinator
Antonio Ruiz Porras

Authors
Moisés Alejandro Alarcón Osuna
Damara Semirais Álvarez González
Javier Emmanuel Anguiano Pita
Oscar Yahevh Carrera Mora
Evangelina Cruz Barba
Rafael Salvador Espinosa Ramírez
Carlos Fong Reynoso
Luis Ernesto Ocampo Figueroa
María Catalina Ovando Chico
Antonio Ruíz Porras
Salvador Sandoval Bravo

Universidad de Guadalajara
Centro Universitario de Ciencias Económico Administrativas
División de Economía y Sociedad
Plataforma Economía de Jalisco
Doctorado en Estudios Económicos
Centro de Investigación de Teoría Económica

La Plataforma Economía de Jalisco tiene como objetivo general generar y difundir información útil y accesible sobre los retos de la economía de Jalisco a todos los sectores de la población y realizar investigación aplicada a las diversas problemáticas en los tópicos de la economía, las políticas públicas, el desarrollo regional, la sociodemografía y el análisis geoespacial para la transferencia de conocimientos en la toma de decisiones.

Contents

Introduction

Antonio Ruiz Porras

Traditionally, the development of the economic science and the economic policy has depended on specific concerns. Particularly, since the outburst of sanitary and economic crises of 2020, it has been recognized the necessity of promoting the recovery and development of the economies worldwide. Such concern has encouraged the study and implementation of diverse policy alternatives among policy-makers, economic agents and academics alike. In this book, "Rebuilding The Economy: Economic Policies for Recovery and Development", we include five studies written by Mexican scholars. The common denominator of the such studies is that all of them recommend specific policies based on the results supported by contemporary statistical techniques and/or by formal theoretical models.

The book is organized into five independent chapters. Each chapter comprises a specific policy-oriented study. These chapters are the following: 1) E-Government development based on variety of capitalism: A comparative study; 2) Environmental awareness and pollution quota in the presence of oligopolistic competition; 3) International Tourism Demand in Mexico: Structural Breaks and Public Policy Implications; 4)

MSMEs in the face of economic reconstruction: Learning curves and changes in business structures; and 5) Financial inclusion of Mexican households in the informal financial system.

In the first chapter, "E-Government development based on variety of capitalism: A comparative study", Oscar Carrera-Mora and Catalina Ovando-Chico explain how certain policies, described generically with the name of variety of capitalism (VoC), can limit or encourage the development of e-government and the economy. Their analysis relies on indicators of e-government development and indicators of country development. Their main conclusion is that the countries whose VoC are structured around hierarchical economies have low levels of e-government development. Thus, countries whose VoC are aligned to the features of a coordinated market or a liberal economy, have high levels of e-government development.

In the second chapter, "Environmental awareness and pollution quota in the presence of oligopolistic competition", Salvador Sandoval-Bravo and Rafael Espinosa-Ramírez rationalize certain policy decisions when the production of goods creates pollution. Their theoretical study focuses on the economic dilemmas faced by policy-makers. Specifically, the authors develop an oligopolistic model in which two firms produce a homogenous good with different technologies. One firm produces the good with a polluting technology and the other produce it with a non-polluting technology. In this context, the authors analyze the incentives that a government may have to set a pollution quota to the polluting firm. They find that the government can set a positive pollution quota when the marginal disutility of pollution and/or the level of consumers´ environmental awareness are large. Moreover, they find that the optimal pollution quota is zero when the marginal pollution disutility and/or the level of environmental awareness are small.

In the third chapter, "International Tourism Demand in Mexico: Structural Breaks and Public Policy Implications", Evangelina Cruz-Barba and Javier Emmanuel Anguiano-Pita study the dynamics of international tourism in Mexico. Their empirical study relies on Mexican data for the 1980-2019 period and time-series tests for detecting multiple structural breaks. The authors´ main conclusion is that "neoliberal" public poli-

cies have had effects on international tourism. Furthermore, they argue that it is urgent to reorient public policies to emphasize cultural tourism products over the "sun-and-sand" ones. Moreover, they argue that, in the aftermath of the 2020 crisis, such policies should promote sustainable tourism, health security and social responsibility. In this context, they also point out that it is necessary to take measures in order to guarantee the short and long-term carrying capacity of tourist destinations.

In the fourth chapter, "MSMEs in the face of economic reconstruction: Learning curves and changes in business structures", Moisés Alejandro Alarcón-Osuna, Carlos Fong-Reynoso and Luis Ernesto Ocampo-Figueroa analyze the sectoral behavior of Micro, Small and Medium Enterprises (MSMEs) during the COVID-19 pandemic. They develop such study to determine the specific sectors that may lead the recovery of the economy. They develop their study with learning curves of the different firms´ sectors and estimations of the potential changes in their business structure. Their findings show that firms of the technological sector may have a better performance than those in non-technological sectors. Furthermore, their estimations show that economies of scale are irrelevant for the latter firms. In this context, the authors conclude that policies relevant for the economic recovery should foster firms with economies of focus and, particularly, those with an intensive use of technology.

In the fifth chapter, "Financial inclusion of Mexican households in the informal financial system", Damara Álvarez-González and Antonio Ruíz-Porras study the financial inclusion determinants of Mexican households using supply-side, demand-side and socioeconomic determinants of the access and use of savings and credit products. They focus on the main products available in the informal financial system. They use micro data from surveys for the years 2012, 2015 and 2018. Their findings show that: 1) the access and use of informal financial products have been similar among Mexican households; 2) households with workers with benefits have had a higher level of financial inclusion than households with workers without benefits; 3) the most important determinants to savings, credit and financial inclusion are the level of education, the availability of savings and the existence of labor income; and , 4) there is little evidence that

women have advantages with respect to men regarding savings, credit or financial inclusion.

We should point out that the studies assume, implicitly or explicitly, that the success of their policy recommendations would depend on the private and the public sectors. Thus, the main contribution of the book is to show that the collaboration between the public and private sectors may be fundamental to achieve the recovery and development of the Mexican economy. In this context, the studies challenge the traditional approach regarding the prevalence of the public sector in the design and implementation of economic policies. However, collaboration depends on well-functioning institutions. Thus, the second contribution of this book, is to implicitly acknowledge the importance of formal and informal institutions for encouraging the recovery and the development of the Mexican economy.

Finally, we would like to mention that this book would not have been possible without the support of the project "Economy Platform of Jalisco" (known in Spanish as PLEJ) of the University Center of Economic and Managerial Sciences (known as CUCEA) of the University of Guadalajara. Particularly, we gratefully acknowledge the institutional and personal support of Dr. Antonio Sanchez-Bernal, Director of the Economy and Society Division of CUCEA and Leader of the PLEJ project. We also acknowledge the academic support from the members of the PLEJ Research Group on "Comparative Economic Policy Analysis", of the Ph.D. in Economic Studies Program (known as DEEC), and of the Research Center in Economic Theory (known as CITEC) of the University of Guadalajara. We also thank the administrative support provided by Gemma Cithlalli López-López and Carolina Saavedra-Ramírez. The support provided by all of them has been essential to define this book. We hope that academics, students and policymakers will find the book useful for understanding and promoting policies useful to encourage the recovery and development of the Mexican economy after the Covid pandemic.

CHAPTER ONE

E-Government Development Based on Variety of Capitalism: A Comparative Study

Oscar Yahevh Carrera Mora
María Catalina Ovando Chico

Introduction

The incorporation of ICT (information and communication technologies) in organizations is a trend that has been taking hold continuously for various reasons and has now become necessary due to the conditions of social distancing generated by the COVID-19 pandemic. This event has brought with it obligatory changes that should prevail in the post-pandemic era, according to the perspectives revealed by various researches. In this case, ICTs have been elements that not only enable the private sector, but also the government sector to offer services in accordance with citizens' needs, thus promoting the need to include citizens in public services through the incorporation of ICTs.

However, the development and growth of the technological platforms known as e-government has been and will continue to be different in each country, so it is necessary to establish a clearer picture of the needs of each nation based on the different political, economic, and social scenarios that prevail in each one of them.

For this, it is important to establish how the technological landscape of each country is driven. Thus, one of the main elements to classify is how a country develops is its economic system, since its economic potential defines parameters that determine its growth, thus contributing to various aspects related to technology such as technological infrastructure, internet availability, people's training, and human capital index, among other indicators that show the benefit or limit to the development and use of these technologies in the service of the population.

This research is based on the perspective of the varieties of capitalism (VoC) approach as presented by Hall and Soskice (2001) and Schneider (2009) who propose that countries with a capitalist economic model can be classified based on a typology of variants of capitalism, where coordinated market economies (CME), liberal market economies (LME) and hierarchical market economies (HME) can be observed, according to their respective development characteristics. The study then carries out a comparative analysis of e-government development indicators against economic development indicators such as per capita GDP, the human development index (HDI), the human capital index, the globalization index, and the telecommunications infrastructure index.

Literature Review

E-Government

In the era of information and communication technologies (ICT), electronic government or e-government schemes represent a great opportunity for governments to offer better and faster services to their citizens. However, the success or failure of these projects to achieve their intended objectives depends largely on some important aspects, mainly those derived from their development and implementation (Vinish and Keun, 2018. The e-government services that many governments around the world make available to their populations have significantly improved the effectiveness and efficiency of government services.

The success of e-government, according to the study by Carrera, *et al.* (2020), depends on two major dimensions; first, infrastructure, which includes elements such as networks and telecommunications, the number of internet users, and the number of computers per capita, among others and second, infostructure, which contains intangible elements such as education for literacy and technological knowledge that a person has, among other factors intrinsic to individuals' training.

Therefore, it can be established that the main success of these platforms depends fundamentally on the attention paid by their governments to various factors attached to these dimensions that could benefit or harm their development and the subsequent participation of the people in these platforms; however, most studies regarding the infrastructure dimension focus their attention on elements such as infrastructure and telecommunications, innovation, and the digital divide (Glyptis, *et al.,* 2020; Shkarlet, *et al*., 2020; Tan, *et al*., 2020; Shkarlet, *et al.*, 2020; Tan, *et al.*, 2020), and those that are focused on the usage dimension fix their gaze on individual adoption factors derived from people's behavior (Chen, *et al.*, 2019; Lallmahomed, *et al.,* 2017;). However, there are macroeconomic elements that affect both dimensions and that often appear to be explicit elements but are only grounded in perception, not in studies that demonstrate the associations that give rise to these factors.

In this regard, one of the fundamental elements that requires attention is the economic system, which is a background factor because it influences economic and social development, greater innovation, and other macroeconomic elements that affect both dimensions of e-government success because it can limit investment in infrastructure, innovation, education, and other elements that favor the development of e-government (Chang and Almaghalsah, 2020). Therefore, one of the differentials of this study is the perspective of focusing on countries that share a capitalist economic model based on Hall and Soskice's (2001) theoretical perspective of varieties of capitalism, which enables identification of those countries within a particular periphery with more challenges and challenges to grow in the worldwide e-government ranking.

Varieties of Capitalism (VoC)

Capitalist economies can be compared through the actions they incorporate to try to solve their economic problems with strategies oriented to generating more capital. From this perspective, the varieties of capitalism (VoC) approach developed by Hall and Soskice (2001) is important for this study, because they propose two poles of capitalist economies; on the one hand liberal market economies (LMEs) as in the case of the United States and on the other hand, coordinated market economies (CMEs), as in the case of Germany.

However, in the view of several authors such as Aguirre and Lo Vuolo (2013), Feldmann (2019), Schneider (2009), Schneider and Soskice (2009) and Kiran (2017) the notion of Hall and Soskice (2001) is limited and polarized, due to the fact that countries such as those in Latin America (LA) have different characteristics from these poles. For this reason, the idea of Schneider (2009) is incorporated, which states that the diversity of VoC explained by Hall and Soskice (2001) is restricted to two types of market economies, and therefore adds hierarchical market economies (HMEs) for the study of capitalism in LA.

Schneider's (2009) central argument identifies four ideal types of capitalist systems or VoC defined as liberal market economy (LME), coordinated market economy (CME), market economy networks (NMEs) and hierarchical market economy (HME). This perspective helps to identify four fundamental characteristics of market economies that structure the development, access, and use of technology in these countries. In fact, Hall and Soskice (2001) argue that patterns of technological specialization are largely determined by the prevailing variety of capitalism.

Thus, the relationships of a specific type of VoC could show similar characteristics in developed and developing countries in slowing down or motivating the evolution of e-government. Therefore, the progressive digitalization of the economy and the world of work is testing the economic and social model that generates elements that provide or do not provide elements for people's inclusion in technology and its new environments. Therefore, patterns of technological adoption can be explained through

the effect of institutional constraints, which may be liberal, coordinated, or hierarchical market economies (Farndale, *et al.*, 2017).

Coordinated Market Economy (CME)

Coordinated market economies (CME) exchange private information through non-market institutions – for example, unions and business associations (Hall and Soskice, 2001). Thus, a CME is characterized by firms focusing on a fixed set of high-quality products, sufficient skilled workers, a long-term relationship between firms and employees, and a strong relationship with a particular place of production that allows for better development of human capital and economic stability of individuals because of the strong employment protection laws in such countries, among which we find cases such as Germany, Finland, Norway, and Japan.

For example, according to Rahner and Schönstein (2018), in Germany the ongoing digitalization in the labor market changes sectors, jobs and tasks. Overall, the German labor market is in good shape. Labor market forecasts mostly envisage a period of labor stability until 2030 and agree that the current number of workers is going to remain more or less the same until then, which benefits the population in the purchase of devices in the medium term and the adoption of broadband and mobile internet services that allow them to more easily access the electronic public services developed and implemented by the government.

Liberal Market Economy (LME)

An LME in contrast to an CME has an orientation towards labor flexibilization that allows companies greater control, exercising constant changes that allow them to steal intellectual capital, investing large sums of capital in technological innovation, which leads these types of countries to be technological pioneers. Within this type of capitalist economic system, we have countries such as the United States, United Kingdom, Canada, and Australia.

In fact, based on MacNeil's (2013) perspective, it is possible to establish this idea of a disruptive technology, as he explains that liberal mar-

ket economies tend to engender radical innovation cycles based on the relative absence of states, internal corporate hierarchies, and competitive market arrangements.

Within this framework of study, the VoC literature has attempted to structure an analytical picture of U.S. innovation based on the idea that as an archetypal LME country, its technological development is driven primarily by relatively free market processes (Akkermans, *et al.*, 2009; Malik and Huo, 2019) without much extra-economic or political assistance facilitating the conditions for further technology development, which undoubtedly benefits e-government development.

Hierarchical Market Economy (HME)

In contrast to CME and LME, HME are characterized by the concentration of production and credit mostly in local economic groups and multinational companies, fragmented labor markets and deficient educational systems, which do not stimulate the growth of a skilled labor force, nor investment in research and development. Schneider (2009) states that this is the form of capitalism that predominates in Latin America.

According to Schneider's (2009) view, an HME in terms of corporate governance and labor relations should have four main characteristics, which are: 1) diversified business groups, 2) relations with government and multinational companies, 3) atomistic labor relations, and 4) workers with low qualifications. These four fundamental characteristics of HME in Latin America (LA) structure companies' access to the essential inputs of capital, technology and labor, which explains some of the fundamental reasons for the minimal progress of e-government in these nations.

This type of VoC was proposed for countries such as Mexico, Chile, Argentina, and Brazil. Kiran (2017) states that Turkey is also a type of HME. In general terms this causes local economic groups to prefer to buy and acquire technology, rather than to produce it, which makes most of their innovations adaptive rather than original. In LA it is the state, not the private sector, that makes most of the investment in research and development (R&D), so transformations can be driven by the state, which is an important factor in the author's argument.

Schneider (2009) argues that on the other hand, policy and institutional framework prevent the implementation of policies of investment in human capital and in transformation of the business organization, decisively influencing technological innovation, the development of skills and the reduction of inequality. This limits the elimination of factors that hinder the development of e-government, such as the digital divide caused by low investment in telecommunications infrastructure, low availability and acquisition of mobile devices by the people, and limitations in internet connections and the human capital index.

Therefore, we can establish that the countries of diverse VoC types have specific characteristics that explain their growth in terms of technology, human capital and economics, elements that are affected by various characteristics of their political system. This being so, research on capitalist diversity and the institutional foundations of economic development can be reinvigorated in the current era of globalization (Feldmann, 2019).

Methodology

Hypothesis

The theoretical perspective of VoC considers that the various forms adopted by capitalist systems are distinguished by the ways in which social agents and institutional systems are related in each respective context (Aguirre and Lo Vuolo, 2013). The hypothesis of this study states that a country whose capitalist economic model is like an HME will have lower e-government development. If its characteristics mostly fall within those of a CME or an LME, its development will be higher, reflected in a higher ranking. In other words, it is proposed that e-government development in an HME is generally limited compared to countries in a CME or an LME.

Indicators

The key indicators that provide an overview of the development of e-government have been defined by the United Nations (UN, 2020) through its

biennial e-government report, where we can find an analysis of three elements; 1) online services index (OSI), 2) human capital index (HCI) and 3) telecommunications infrastructure index (TII), which together make up the EDGI (electronic government development index). These indicators cover both dimensions of e-government success; namely, infrastructure and infostructure. However, for this study, the additional indicators per capita GDP, the human development index and the globalization index are also incorporated.

These indicators are added in order to test the hypothesis, since under the approach of this study, a country with an economic model that matches one of those proposed by the VoC theory has conditions that are typical of the type in which it is located (HME, CME or LME). Therefore, these indicators of economic growth and human development enable a clear picture of the sufficiency or deficiency to be established in terms of the infrastructure and infostructure of the country in order to have better of e-government development, to understand why its e-government development is being limited.

Also, based on the notion of Shkarlet, *et al.*, (2020), these indicators offer the opportunity to identify the advantages and disadvantages of existing systems to find ways to optimize and improve the efficiency of public administration. In terms of e-government indicators, the base indicator for the first analysis of this study is the e-government ranking, and the second indicator to be compared will be the EDGI indicator over the last 10 years, from 2010 to 2020 based on the data published by the UN (2020) and (2020a) in their biennial reports. These data are compared with the indicators of per capita GDP, human capital index (HCI), human development index (HDI) and the globalization index (Glob_dfac), data obtained from the UN (2020a), UNDP (2020, 2018, 2016, 2014, 2014, 2012 and 2010) and the KOF (2020) globalization index ranking.

Sample

The indicators listed above are compared for four countries representative of each of the VoC types based on the theory of Hall and Soskice (2008) and Schneider (2009); see Table 1.

Table 1

Countries selected for the study

LME	CME	HME
United States	Germany	Argentina
United Kingdom	Norway	Brazil
Canada	Finland	Chile
Australia	Sweden	Mexico

Source: Authors.

Study type

The data are first analyzed with a correlation analysis to verify the relationship between the indicators per capita GDP, human capital index, human development index and the globalization index, and the e-government index. Next, a descriptive analysis is performed, which is presented in a bar chart that shows the ranking of all countries in the selected years and by VoC (HME, LME and CME).

Analysis

The simple linear regression model has the following expression: (1) $y = \beta_0 + \beta_1 x + \varepsilon$, where β_0 and β_1 are the parameters of the model; ε is a residual error variable that explains the variability that cannot be explained by the linear relationship between x and y. Through this function we validated the degree of association of the HDI, HCI, GNI_per_capita and Glob indicators with the EDGI individually (linear correlation), using data for each of the indices from the years 2010 to 2020 on a biennial basis; see Table 2.

Table 2
Linear regression analysis

Summary model				
Model	R	R squared	R squared fitted	Standard error of the estimate
1	.859a	.738	.722	.05962140
a. Predictors: (Constant), IDH, HCI, GNI_per_capita, GLOB_DFAC				

Source: Authors.

Correlation analysis

The results (see Table 3) yielded a Pearson correlation coefficient (simple) greater than 0, which indicates that there is a statistically significant and positive correlation between the e-government development index (EDGI) and the GNI per capita, HCI, HDI and globalization indicators.

Table 3
Correlations

		EGDI	GNI_per_capita	HCI	IDH	GLOB_DFAC
EGDI	Pearson correlation	1	.715**	.543**	.849**	.789**
	Next (bilateral)		.000	.000	.000	.000
	N	72	72	72	72	72
**. The correlation is significant at the 0.01 level (bilateral).						

4.3. Descriptive analysis

The descriptive analysis shows that countries classified as HME have lower development compared to countries in an LME or a CME. It is also possible to observe that countries with an LME are in a better position, which confirms the theory that an LME develops more disruptive innovation due to the high concentration of technology companies and flexible labor standards (see Table 4 and Figure 1).

Table 4
Comparative e-government ranking from 2010 to 2020

VoC	COUNTRY	2010	2012	2014	2016	2018	2020
HME	MEXICO	56	55	63	59	64	61
	ARGENTINA	48	56	46	41	43	29
	BRAZIL	61	59	57	51	44	54
	CHILE	34	39	33	42	42	34
LME	CANADA	8	11	11	14	23	28
	UNITED STATES	2	5	7	12	11	9
	UNITED KINGDOM	4	3	8	1	4	7
	AUSTRALIA	8	12	2	2	2	5
CME	GERMANY	15	17	21	15	12	25
	NORWAY	6	8	13	18	14	13
	FINLAND	19	9	10	5	6	4
	SWEDEN	12	7	14	6	5	6

Source: Authors.

Figure 1
Comparison of e-government ranking from 2010 to 2020
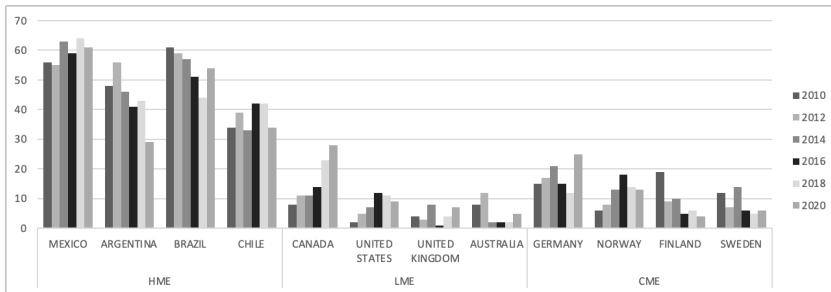
Source: Authors

Table 5 and Figure 2 show average EDGI (electronic government development index) for the years 2010 to 2020 on a biennial basis, which again shows that the HMEs are less developed than the CMEs and the LMEs.

Table 5
Comparison of EDGI from 2010 to 2020

VoC	COUNTRY	2010	2012	2014	2016	2018	2020	Average
HME	MEXICO	0.515	0.624	0.5733	0.6195	0.6818	0.7727	0.631
	ARGENTINA	0.5467	0.6228	0.6306	0.6978	0.7335	0.8279	0.677
	BRAZIL	0.5006	0.6167	0.6008	0.6377	0.7327	0.7677	0.643
	CHILE	0.6014	0.6769	0.7122	0.6949	0.735	0.8259	0.708
LME	CANADA	0.8848	0.843	0.8418	0.8285	0.8258	0.842	0.844
	UNITED STATES	0.851	0.8687	0.8748	0.842	0.8769	0.9297	0.874
	UNITED KINGDOM	0.8147	0.896	0.8695	0.9193	0.8999	0.9358	0.889
	AUSTRALIA	0.7863	0.839	0.9103	0.9143	0.9053	0.9432	0.883
CME	GERMANY	0.7309	0.8079	0.7864	0.821	0.8765	0.8524	0.813
	NORWAY	0.802	0.8593	0.8357	0.8117	0.8557	0.9064	0.845
	FINLAND	0.6967	0.8505	0.8449	0.8817	0.8815	0.9452	0.850
	SWEDEN	0.7474	0.8599	0.8225	0.8704	0.8882	0.9365	0.854

Source: Authors

Figure 2
Average biennial EDGI from 2010 to 2020
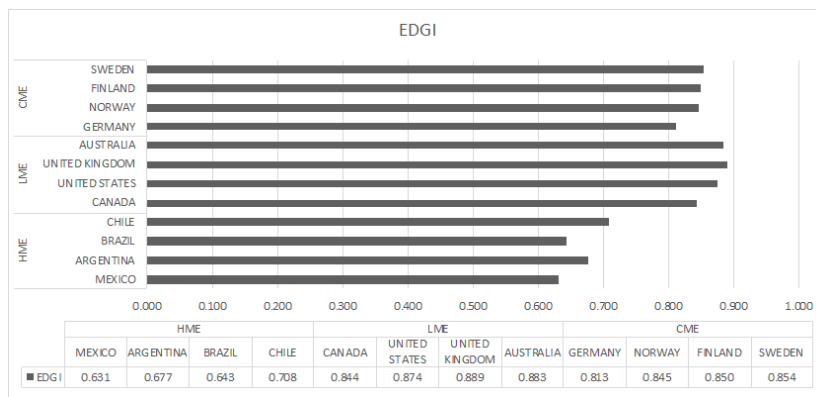
Source: Authors

The e-participation index of the biannual UN reports from 2010 to 2020 was also analyzed; the data show the difference in participation in e-gov-

ernment platforms, participation being lower in the HMEs compared to the CMEs and LMEs; see Table 6 and Figure 3.

Table 6
Comparison of e-participation index from 2010 to 2020

VoC	COUNTRY	2010	2012	2014	2016	2018	2020
HME	MEXICO	0.3714	0.5789	0.6078	0.8814	0.9438	0.8214
	ARGENTINA	0.2	0.2895	0.549	0.6271	0.6236	0.8571
	BRAZIL	0.2857	0.5	0.7059	0.7288	0.9719	0.9048
	CHILE	0.3429	0.6579	0.9412	0.7458	0.8202	0.8571
LME	CANADA	0.7286	0.6842	0.8235	0.9153	0.9101	0.9405
	UNITED STATES	0.7571	0.9211	0.9216	0.8983	0.9831	1
	UNITED KINGDOM	0.7714	0.9211	0.9608	1	0.9831	0.9762
	AUSTRALIA	0.9143	0.7632	0.9412	0.9831	0.9831	0.9643
CME	GERMANY	0.6143	0.7632	0.7864	0.7627	0.9213	0.75
	NORWAY	0.5	0.6842	0.6863	0.7627	0.9775	0.9048
	FINLAND	0.4143	0.7368	0.7059	0.9153	1	0.9524
	SWEDEN	0.4857	0.6842	0.6078	0.7627	0.9382	0.8214

Source: Authors

Figure 3
Comparative biennial participation rate 2010 to 2020
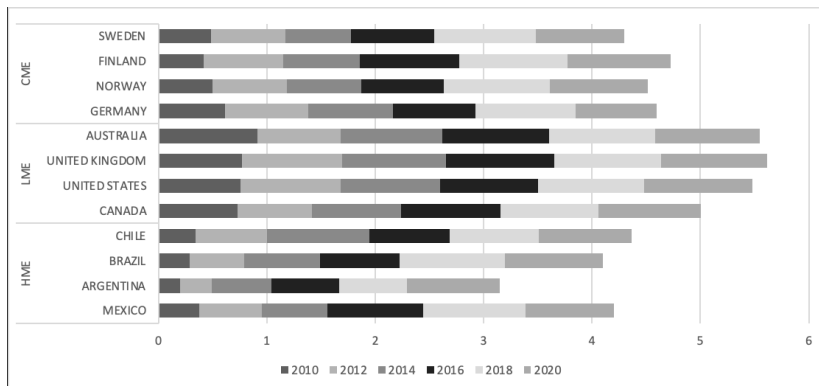
Source: Authors

Conclusions and Discussion

As has been observed throughout this study, the variety of capitalism of a country is an important element of analysis, since it limits or benefits the development of e-government in a country. In fact, the indicators used in the correlation analysis indicate a strong positive correlation between the development indicators and the EDGI, enabling the differences between the countries that make up the three VoC groups to be clearly observed. The descriptive analysis demonstrates more precisely the high difference in e-government development between the countries with a hierarchical market economy versus a coordinated or liberal market economy and not only in terms of e-government, but also in terms of the other indicators.

It can be observed that the LME and CME groups are closer to each other in terms of the results of the e-government development index, but in spite of this, the liberal market economies are higher. This has a theoretical explanation; namely, that the LME by their regulations and nature are countries with greater innovation development. In fact, the theory indicates that in technological matters they are disruptive countries, unlike countries aligned to a CME, which have more conservative policies as far as employment is concerned, leading them to develop innovations more aligned to the field of incremental innovation, as in the case of Germany.

This analysis also provides evidence in theory and in the indicators shown that developing countries classified as HMEs have greater limitations in terms of development, which directly affects the growth of their e-government, and this is the case of most countries in Latin America (LA), such as the four that are analyzed here (Mexico, Chile, Argentina, and Brazil). However, the analysis could be done only in these four countries. Further studies should include other countries such as Colombia, Venezuela, Bolivia and others, to carry out a comparative study and verify their e-government development capabilities. Although it is true that a country with these conditions has limitations because it is still developing, this demonstrates the need for greater investment in technology, innovation, and education in developing countries as strategies for the

development of e-government that will result in public policies for the inclusion of citizens in these technologies.

In fact, one of the main characteristics of an HME according to Schneider (2009) is the low qualifications of workers, which reinforces a lack of technological knowledge, making the e-government platforms implemented in these countries less efficient. Another important element of analysis of the spheres that make up the varieties of capitalism is the technological development that in HME countries is mainly driven by the government, so if the government adheres to a socialist ideal, this development will be minimal, thus curbing technological growth in public administration. Evidence of this can be seen in countries such as Argentina, Brazil, Chile, and Mexico.

The human development index (HDI) measures, in particular, the illiteracy rate and per capita income, which showed a high correlation with the EDGI, but also a similarity to low development that can be seen in the graphs, where HME countries are at a much lower level compared to CME and LME countries, which shows that even if HME countries had more public services offered through e-government, the possibility of their use decreases considerably, due to the exclusionary elements generated by a low HDI, lower per capita income and lower technological infrastructure conditions. This indicates a need for greater investment in the factors related to these indicators and of course not only to improve the indicators, but to bring about the positive effects of investing in infrastructure, education, and better social conditions, which are reflected in an increase in these indicators.

It may seem an obvious conclusion when comparing these four HME countries against countries such as the United States and Germany, but a study based on the notion of the varieties of capitalism makes it clear that the economic regime does have an important effect on the development of e-government, which will allow decision-makers to take these elements into account when implementing e-government–based strategies.

Consequently, this study suggests a line of further research; namely, analyzing the political system of HME countries, in order to verify the effects on technological development in terms of e-government, as well as an analysis of their public policies, and the results obtained through a

comparative study with HME nations in Latin America. It will be important to define the most relevant factors for each of these groups, since it has been proven that there is a pattern in the development of e-government among each of the countries with similar characteristics to these three blocks. A subsequent study should thus identify the main factors of perception, such as trust in institutions, and their efficiency based on the characteristics of the e-government platforms, among other elements that could affect the usability of these platforms.

References

Aguirre, J., and Lo Vuolo, R. (2013). Variedades de capitalismo. Una aproximación al estudio comparado del capitalismo y sus aplicaciones para América Latina. Documentos de trabajo CIEPP, 85. Available at: http://www.ciepp.org.ar/index.php?page=shop.getfi- le&file_id=238&product_id=266&option=com_virtuemart&Itemid=1

Akkermans, D., Castaldi, C., and Los, B. (2009). Do 'liberal market economies' really innovate more radically than 'coordinated market economies'? Research Policy 38, 181–191. Doi:10.1016/j.respol.2008.10.002

Bizberg, I. (2019). Diversity of Capitalisms in Latin America. Ed. Macmillan. México.

Carrera-Mora, O. Y., Villafuerte L.F., and Martínez, S. (2020). Factores derivados de la pobreza multidimensional que afectan la usabilidad del e-gobierno en México. Revista Brasileira de Políticas Públicas, Brasília, v. 10, n. 1 p.68-85, 2020. Doi: 10.5102/rbpp.v10i1.6633

Chang, C., and Almaghalsah, C. (2020). Usability evaluation of e-government websites: A case study from Taiwan. International Journal of Data and Network Science, 4(2), 127-138. Doi: 10.5267/j.ijdns.2020.2.004

Chen, L., and Aklikokou, A. K. (2019). Determinants of E-government Adoption: Testing the Mediating Effects of Perceived Usefulness and Perceived Ease of Use. International Journal of Public Administration, 1–16. doi:10.1080/01900692.2019.1660989

Feldmann, M. (2019). Global Varieties of Capitalism. World Politics, 71 (1), 162-196. https://www.muse.jhu.edu/article/715541

Farndale, E., Brewster, C., Ligthart, P., and Poutsma, E. (2017). The effects of market economy type and foreign MNE subsidiaries on the convergence and divergence of HRM. Journal of International Business Studies, 48(9), 1065–1086. doi:10.1057/s41267-017-0094-8

Glyptis, L., Christofi, M., Vrontis, D., Giudice, M. D., Dimitriou, S., and Michael, P. (2020). E-Government implementation challenges in small countries: The project manager's perspective. Technological Forecasting and Social Change, 152, 119880. doi:10.1016/j.techfore.2019.119880

Hall, P. A., and Soskice, D. (2001). An Introduction to Varieties of Capitalism, In Hancké, B. (Ed). Debating Varieties of Capitalism: A Reader. Oxford University Press, Ch. 1, 21-74. doi: 10.1093/0199247757.003.0001

Kiran, J. (2017). Expanding the framework of the varieties of capitalism: Turkey as a hierarchical market economy. Journal of Eurasian Studies, 9 (1), 42-51. doi: 10.1016/j.euras.2017.12.004

KOF (2020). Globalization Index Ranking. Available at: https://kof.ethz.ch/en/forecasts-and-indicators/indicators/kof-globalisation-index.html

Lallmahomed, M. Z. I., Lallmahomed, N., and Lallmahomed, G. M. (2017). Factors influencing the adoption of e-Government services in Mauritius. Telematics and Informatics, 34(4), 57–72. doi:10.1016/j.tele.2017.01.003

MacNeil, R. (2013). Seeding an Energy Technology Revolution in the United States: Re-conceptualising the Nature of Innovation in "Liberal-Market Economies." New Political Economy, 18(1), 64–88. doi:10.1080/13563467.2012.658362

Malik, T.H. and Huo, C. (2019), Entrepreneurial state vs liberal market: Chinese comparative advantage in the transformation of national science to technology artefacts, Chinese Management Studies, Vol. 13 No. 3, pp. 550-573. https://doi.org/10.1108/CMS-07-2018-0600

PNUD (2019). Informe sobre Desarrollo Humano 2019. Más allá del ingreso, más allá de los promedios, más allá del presente: Desigualdades del desarrollo humano en el siglo XXI. Available at: http://hdr.undp.org/sites/default/files/hdr_2019_overview_-_spanish.pdf

PNUD (2016). Informe sobre Desarrollo Humano 2016. Desarrollo humano para todas las personas. Available at: https://reliefweb.int/report/world/informe-sobre-desarrollo-humano-2016-desarrollo-humano-para-todos

PNUD (2014). Informe sobre Desarrollo Humano 2014. Sostener el Progreso Humano: Reducir vulnerabilidades y construir resiliencia. Available at:

https://www.undp.org/content/undp/es/home/librarypage/hdr/2014-human-development-report.html

PNUD (2012). Informe anual 2012. El futuro sostenible que queremos. Available at: https://www.undp.org/content/undp/es/home/librarypage/corporate/annual-report-2011-2012--the-sustainable-future-we-want.html

PNUD (2010). Informe sobre Desarrollo Humano 2010. La verdadera riqueza de las naciones: Caminos al desarrollo humano. Available at: https://www.unaids.org/es/resources/presscentre/featurestories/2010/november/20101105fsundp

Rahner, S., and Schönstein, M. (2018). Germany: Rebalancing the coordinated market economy in times of disruptive technologies. In Neufeind, M., O'Reilly, J., and Ranft, F. (Ed). Work In the Digital Age. Rowman & Littlefield International, 371-384. Available at: https://euagenda.eu/upload/publications/untitled-172035-ea.pdf#page=394

Schneider, B. (2013). Hierarchical Capitalism in Latin America. Cambridge University Press. 1st ed. United States.

Schneider, B. (2009). Hierarchical Market Economies and Varieties of Capitalism in Latin America. Journal of Latin American Studies, 41(3), 553-575. doi:10.1017/S0022216X09990186

Schneider, B., and Soskice, D. (2009). Inequality in developed countries and Latin America: coordinated, liberal and hierarchical systems. Economy and Society, 38 (1), 17-52. doi:10.1080/03085140802560496

Shkarlet, S., Oliychenko, I., Dubyna, M., Ditkovska, M., & Zhovtok, V. (2020). Comparative analysis of best practices in e-Government implementation and use of this experience by developing countries. Administratie si Management Public, 34, 118-136. DOI: 10.24818/amp/2020.34-07

Tan, H., Zhao, X., and Zhang, N. (2020). Technology symbolization: political mechanism of local e-government adoption and implementation. International Review of Administrative Sciences. https://doi.org/10.1177/0020852320915637

UN (2020). UN E-Government Knowledgebase. Available at: https://publicadministration.un.org/egovkb/en-us/Data/Country-Information/id/

UN (2020a). United Nations E-Government Survey 2020. Available at: https://www.un.org/development/desa/publications/publication/2020-united-nations-e-government-survey

Vinish, K., and Keun Y. (2018). ICT access: Testing for convergence across countries, The Information Society, 34:3, 166-182. DOI: 10.1080/01972243.2018.1438549

CHAPTER TWO
Environmental Awareness and pollution Quota in the Presence of Oligopolistic Competition

Salvador Sandoval Bravo
Rafael Salvador Espinosa Ramírez

Introduction

The incessant increase in the demand for goods and services is the main cause of environmental pollution since companies must increase their production levels. The increase in production causes higher emissions of pollutants, and greater pressure on natural resources. In this sense, industrial activities, through their polluting emissions (mainly CO_2, nitrogen oxides, methane, and sulfur oxides), are indirectly or directly causing global warming, desertification, deforestation, the disappearance of species, acid rain, the increase in respiratory, cardiovascular, and intestinal diseases, among other adverse effects on the environment (UNEP, 2019).

In addition to the ecological costs and the damage to human health caused by pollution, firms must consider the economic costs derived from clean technology, since generally investing in clean technology represents higher production costs. On the other hand, governments try to regulate the pollution of firms in a strategic way: governments promote firms be competi-

tive in the market, but at the same time they should reduce the social cost of the firms' polluting emissions.

On the other hand, people through their behavior, consciousness and consumption can influence the care or deterioration of the environment. In this sense, Eccleston and March (2011) classify the areas of application of environmental policies into three groups depending on the agent that applies them: first, the legal sphere (local, national or international); second, the companies and the market; and third, the area of social and personal awareness and motivations. Thus, environmental policies can be implemented by local and national authorities, governments and global organizations through international agreements, local and multinational companies, civil society and individuals.

The efforts are made by the entire agent in the economy. Governments sign agreements with other countries to limit global emissions. Firms act with corporate environmental responsibility, they produce biodegradable articles, invest in clean technology, promote ecological education campaigns, etc. The civil society consumes responsibly and rationally, limits the use of articles with an enduring carbon footprint, recycles, separates and classifies their garbage, among others. However, the environmental policy instruments most studied in the economic literature are those implemented by the government to regulate firms' pollution emissions, for example, taxes, quotas, subsidies, negotiable pollution permits, exemptions, prohibitions; some from the point of view of the economic incentives, and others as direct controls.

In this work, the government uses pollution quotas as an instrument of environmental control, which are quantitative limits of pollutants per unit of output, which the government imposes based on technical and economic criteria. For example, firms that emit their gases in an area, or those that discharge polluted waters into a river, should not exceed the total stipulated by the regulatory entity (Cropper and Oates, 1992). In practice, efforts are made to ensure that such quotas are economically viable for firms, that is, that the costs of these quotas are not very high and are technically possible. In this way, firms must adjust their emissions through the use of appropriate technology to reach the government pollution quota target (Kolstad, 2016).

However, mixed environmental policies are possible, and they involve governments, business, and civil society through joint and coordinated actions (OECD, 2017). In this sense, these mixed environmental policies seek to promote social conscience to the care and preservation of the environment through concrete actions aimed at creating lasting ecological awareness. For example, Gupta (2014) analyzes the level of awareness and participation of people in the protection of the environment, in a Hindu locality, based on the perception of local communities regarding ecological deterioration and the measures adopted to protect the environment. While Weng and Liu (2019) analyze how environmental policies are adjusted at the national and global level when the levels of ecological awareness of countries are modified.

Due to the uncertain nature of policies aimed at civil society, their results become ambiguous and difficult to evaluate, since in some way, they aim to change behavior in individuals, and these, as such, are affected with feelings, conscious and unconscious prejudices, values and attitudes. So there is a gap between these policies and the specific behaviors achieved by individuals as a result of their environmental awareness. In this sense, studies have been carried out that analyze these differences between environmental knowledge, the level of ecological awareness, and real behavior that individuals manifest in caring for their natural environment, such as the classics by Kollmuss and Agyeman (2002) and Chartand (2005), and recently Siegel, Cutter-Mackenzie-Knowles and Bellert (2018).

Actions aimed at creating or raising the environmental awareness of society do not always coincide with the economic objectives of firms, and in this context they may even diverge in both their goals and their scope. In this sense, Koźluk and Timiliotis (2016) argue that the establishment of severe environmental policies can adversely affect international trade flows; Dechezleprêtre and Sato (2017) suggest re-evaluating some regulatory policies in environmental matters, which are supposedly effective, but in practice they are obvious trade barriers; Finally, Stevens (1993) considers that for developing countries the imposition of iron-clad environmental policies can reduce their competitiveness in the world market, and adversely impact employment.

In this paper, we analyze the links between the technology used by firms to control pollution emissions, and the environmental policies used by the government to regulate such emissions in the presence of environmental awareness. In this regard, the seminal works by Kneese and Schultze (1975), Marin (1978), Russell (1979), and Mills and White (1978) argue that the best environmental policies are those that encourage firms to invest in more efficient clean technologies, considering that this investment affects production and cost structure. In this sense, Downing and White (1986), Malueg (1989), Milliman & Prince (1989), and Jung, Krutilla and Boyd (1996) analyze the existing relationships between the efficiency of the technologies used in production, and the different instruments used by the government to control pollution produced by firms. In these studies, the government establishes the environmental policy tool without seeking to promote any technological adoption of new technologies by the firms. On the other hand, Requate and Unold (2001, 2003), develop theoretical models where the environmental policy tools implemented by the government try to induce firms to adopt cleaner technology and achieve a socially optimal level of emissions.

Now, among the works that address technological change and the application of pollution quotas we can mention to Golombek and Hoel (2006, 2008), and Endres and Rundshagen (2013). They analyze the allocation of pollution quotas under conditions of international environmental cooperation, where the costs of reducing pollution are determined through investments in research and development for innovation in more efficient emission control technologies. In these models the pollution quotas are exogenous and are determined by cooperative agreements between countries. On the contrary, Liu and Lin (2017) develop an empirical model for the construction sector in China, where pollution quotas, by geographic regions, are established as endogenous variables and are determined taking into account technological differences among the emission control costs of each region.

This work presents a theoretical model where firms compete in an oligopolistic market for a homogeneous good. Firms produce with different technologies in terms of controlling their emissions, one uses totally clean technology, and the other uses polluting technology. To control pollution,

the government implements a policy of pollution quotas in the presence of a level of environmental awareness among consumers, which influences the determination of the quota. The optimal quota, that maximizes the welfare function, considers the profits of firms, the consumer surplus and the social cost of polluting.

Close to our proposed model, it is the work of Sandoval and Espinosa (2020) who develop an FDI model for the homogeneous good market, in which foreign and national firms use different technologies to control pollution: foreign firms have better technology to reduce pollution than national firms. Obviously, the cost of the non-polluting goods is more onerous than the cost of the polluting good, since goods made with clean production processes are generally more expensive than those using polluting technologies. The model proposed in this work differs mainly from the previous one, in that we consider environmental awareness as a variable affecting the optimal pollution quota. On the other hand, Constant and Davin (2018) developed a theoretical model of mixed environmental policy in which the gradual increase in environmental awareness of citizens is directly financed by the application of pollution taxes, instead of the pollution quotas of contamination used in this document.

After this introduction, in section 2, a partial equilibrium model for the national market of a homogeneous good is developed. The government set pollution quotas as an instrument of environmental control, which are affected by a level of environmental awareness. Section 3 performs a comparative statics analysis for each component of the welfare function: firms, consumers and the social cost of polluting. In section 4, the optimal pollution quota is calculated that maximizes general well-being, and from this, strategic policies are deduced considering the level of environmental awareness. Finally, in section 5, we conclude.

The model

We consider two homogeneous goods in their use, but different in terms of production technology and willingness to consume: one kind of good is produced using non-polluting technology (clean technology) and the

other uses polluting technology. As a result of the polluting technology production process, there is pollution emitted into the atmosphere.

The good produced with non-polluting technology becomes a non-polluting good, and the good produced with polluting technology becomes a polluting good. For example, biodegradable and non-biodegradable goods that are consumed for the same purpose, but produced with different technology. For obvious reasons, we omitted the case in which non-polluting technology may produce a polluting good and *vice-versa*.

In this sense, we consider that there are two firms, one is producing a non-polluting good (x_1), and the other is producing a polluting good (x_2). Both firms compete in an oligopolistic industry. The marginal cost determined by technological and factor-market conditions of each firm is $c_i = (i = 1, 2)$, where 1 is for non-polluting good and 2 is for polluting good. Both marginal costs are taken to be constant, and therefore equal the average variable cost. However, these costs differ between firms. On the other hand, there is a policy induced cost for polluting firm, k_2, which will be spelt later on. Profits of each non-polluting and polluting firm are,

(1) $\pi_1 = (p_1 - c_1)x_1$
(2) $\pi_2 = (p_2 - c_2 - k_2)x_2$

Such that $c_1 > c_2$

Where π_1 is the profit of the non-polluting firm, and π_2 is the profit of the polluting firms. We consider that the cost of producing non-polluting output is larger than the cost of producing polluting output. It means that non-polluting technology is more expensive than the polluting technology according to the vast majority of the empirical literature. The firm producing polluting output have a competitive advantage over the firm producing non-polluting output.

On the other hand, consumers may perceive that the goods to be consumed are homogeneous in use but different in terms of polluting characteristics. They made a consumption decision according to their environmental concerns. In other words, even when the goods produced are identical in their use, consumers may differ in their willingness to con-

sume those goods for environmental reasons. Under these assumptions, we can consider different demands with homogeneous goods.

Different to the bulk of literature, we consider goods differentiation in terms of willingness to pay for them according to environmental concerns. The demands of goods are differentiated by the perception of the consumer according to his "Environmental Awareness". A large level of environmental awareness implies to consume non-polluting goods rather than polluting goods.

In our model, the consumer may decide to consume polluting or non-polluting goods depending on his environmental awareness rather than the characteristics of the use of the goods. In here, the goods have exactly the same use for consumers. A helpful example is the plastic bags versus biodegradable bags used in commercial supermarkets. They have exactly the same use, but they are different in terms of their producing technology. People may decide to consume plastic or biodegradable bags according to environmental awareness. A greater environmental awareness changes the preferences of consumers from polluting to non-polluting goods.

We assume, without loss of generality, that a larger environmental awareness affects negatively the preference for polluting good. The same result holds if we assume that a larger environmental awareness affects positively the preferences for non-polluting good or both cases at the same time.

One way to model the willingness to consume a polluting good is considering that consumer agrees to pay a smaller price for the polluting good than for the non-polluting good. A larger environmental awareness means a smaller consumer price for the polluting good. In order to simplify the analysis, we assume linear demands such that the intercept of demand is showing the level of price the consumer agrees to pay for a specific good. So, we have differentiated demands from the intercept.

We consider that the intercept of the demand shows the willingness to consume a specific good because it is the source for preferences on consumers; a larger intercept means a larger willingness to pay for a good. We assume a quasilinear utility function where utility can be approximated from $u = u(x) + m$ where x is the goods vector under consideration and m is the expenditure on the numeraire good. The use of this approximation

removes a number of theoretical difficulties, including income effects. There is a numeraire good in the background which is produced under competitive conditions and a factor of production whose price is determined in the competitive sector. The inverse demand function is derived from a quadratic utility function such that,

(3) $\qquad p_1 = a_1 - bQ$

(4) $\qquad p_2 = a_2(\gamma) - bQ$

where p_1 ($i = 1,2$) and Q are respectively the price and the total demand of the goods. Since the goods are non-tradable, the total domestic demand must be equal to the total production, such that,

(5) $\qquad Q = x_1 + x_2$

The first demand (3) is for non-polluting good and the second (4) is for polluting good. x_1 and x_2 are the amount of non-polluting and polluting goods. The intercept of demand in (3) is a_1, and it is fixed; the intercept of demand in (4) is a function of the level of environmental awareness (γ), such that $a_2 = a_2(\gamma)$, and it is decreasing ($a'_2 < 0$). In other words, a larger level of environmental awareness, smaller is the willingness to consume the polluting good.

The level of environmental awareness runs from zero to some maximum level of environmental awareness such that $0 < \gamma < \bar{\gamma}$. When the level of environmental awareness is zero ($\gamma = 0$) the consumer does not care about the polluting damage caused by the consumption of the polluting goods. In such a case, the size of the demand for pollution goods is larger than the size of the non-polluting goods. On the other hand, when the level of environmental awareness is the largest possible ($\gamma = \bar{\gamma}$), the demand for polluting goods is zero, and the only existing demand is for non-polluting goods. In brief, we can consider that $a_2(0) > a_1 > a_2(\bar{\gamma})$.

An interesting feature in (3) and (4) is that, given that the use of both goods is the same, the prices of them depend on the number of goods available in the market independently of their polluting characteristics. The price of each type of good depends on the sum of polluting and non-polluting

goods. Once again, the goods are homogeneous in use, but the demands differ according to the willingness to consume non-polluting goods.

Each firm has a Cournot perception: it takes the output of other firms as given while maximizing its profits. Under Cournot-Nash assumptions from (1) to (5) profit maximization yields the following result

$$(6) \ x_1 = \frac{2s_1 - s_2}{3b}$$

$$(7) \ x_2 = \frac{2s_2 - s_1}{3b}$$

such that
$$s_1 = (a_1 - c_1) > 0$$
$$s_2 = (a_2 - c_2 - k_2) > 0$$
$$x_1, x_2 > 0$$

With a higher level of environmental awareness, the optimal polluting output would be small and the optimal non-polluting output would be large. For instance, when $\gamma \to \bar{\gamma}$, then $x_2 \to 0$, and $x_1 > x_2$. The benefit of each oligopolistic firm is given by (6) and (7) in (1) and (2) as

$$(8) \qquad \pi_1 = bx_1^2$$
$$(9) \qquad \pi_2 = bx_2^2$$

Until now, we have considered the basic market structure. Now, we wonder how pollution may affect the health of the people in the country given by the production and consumption of polluting goods.

Pollution from the polluting technology production process is considered a negative externality which implies some cost to abate it. This negative externality calls for a policy effort to reduce the emission of pollution. For this to be the case, we assume a host government that is considering applying an environmental policy, let say pollution quota, to control the emission of pollution of the polluting firm to avoid environmental degradation. Following Lahiri and Ono (2000), we consider a pollution quota,

which may affect the production decision of both firms, and therefore, the amount of pollution emitted into the atmosphere by the production process of polluting good.

The policy induced cost structure of polluting firms can be written as

(10) $k_2 = \lambda(\theta - z_2)$

The amount of pollution generated (before any abatement) by the polluting firm is θx_2, where θ is the production technology and it is constant. A small 0 means that the environmental production technology adopted by the polluting firm is more efficient, there is less pollution emitted by this firm. On the other hand, we assume that the abatement technology is such that it costs firm 2 a constant amount λ to abate one unit of pollution. A pollution quota has associated the cost of pollution abatement. Denoting z_2 the post-abatement pollution level per unit of output, $\lambda(\theta - z_2)$ is the unit abatement cost for polluting firm.

On the other hand, the consumption of polluting goods produces a negative externality as well. This negative externality is given just by the presence of the good itself. For instance, the plastic bag is a polluting good once it is in the market. The decision to introduce this polluting good in the market is not from the government but consumers who demand the polluting good. The government takes care of the pollution emitted in the process of making the polluting good, but consumers take care of the consumption of the polluting good. When consumers are getting a larger level of environmental awareness, they decide to consume less polluting good, reducing their negative impact on health.

Once we have set the defined solutions forms, we are going to set the welfare function of the country taking into account the use of the pollution policy. The welfare can be written as,

(11) $W = \pi_1 + \pi_2 + CS - \psi z_2 x_2 - \varphi x_2$

Where the first and second terms are the producer surplus, the third term is the consumer surplus and, the fourth and fifth terms are the total technical disutility for producing and consuming the polluting good respec-

tively. In here, ψ is the technical marginal pollution disutility of producing polluting good, and φ is the technical marginal pollution disutility for consuming the polluting good. These technical marginal pollution disutilities are the measures of the impact of pollution on people health due to production and consumption of polluting goods. They are not related to the environmental awareness since the social environmental conscience of people depends of social perception rather than technical measures. We assume, as do Lahiri and Ono (2000), and Markusen, Morey and Olewiler (1993, 1995), that marginal pollution disutilites are constant. Other authors, like Asako (1979), consider that marginal disutility is an increasing function of the output. However, this alternative assumption will not contradict our results and constant marginal disutilities are a more convenient assumption

From the linearity of demand, the consumer surplus of both goods can be defined as

$$CS = bQ^2$$

where

$$(12) \qquad dCS = 2bQdQ$$

The equations (1) - (12) form the backbone for the following analysis. Once we have defined the government objective function, we shall analyse some comparative statics.

Comparative Statics

In this section, we shall determine the comparative statics of the change of pollution quota on key variables as output, consumer surplus, producer surplus, and pollution disutility. First of all, the effect of an increase in the pollution quota z_2 on the cost of firm 2, from (10) we have

$$(13) \qquad \frac{dk_2}{dz_2} = -\lambda < 0$$

An increase in the allowed pollution quota of firm 2, reduces the amount of pollution to be abated by the firm, and thus its cost. From (6) and (7) using (13) we get

(14) $$\frac{dx_1}{dz_2} = -\frac{\lambda}{3b} < 0$$

(15) $$\frac{dx_2}{dz_2} = \frac{2\lambda}{3b} > 0$$

An increase in the pollution quota increases the output produced by the polluting firm because of cost reduction. On the other hand, this increase in the quota reduces the output produced by the non-polluting firm because the firm is facing a competitive disadvantage given by the cost reduction of the firm 2. The effect on profits of firms is given by (8) and (9) using (16) and (17) such that

(16) $$\frac{d\pi_1}{dz_2} = -\frac{2\lambda}{3} x_1 < 0$$

(17) $$\frac{d\pi_2}{dz_2} = \frac{4\lambda}{3} x_2 > 0$$

Following the last intuition, an increase in the pollution quota of firm 2 increases the profit of polluting firm because the competitive advantage of cost reduction, and reduces the profit of the clean firm. To see the impact of pollution quota on consumer surplus from (12) and using (14) and (15) we get

(18) $$\frac{dCS}{dz_2} = \frac{2\lambda}{3} Q > 0$$

Even when the pollution quota has a contradictory effect on the output produced by both firms, the increasing output is larger than the decreasing one. Increasing the allowed pollution quota increases the output of polluting good and decreases the output of non-pollution good. The increase in the polluting good is larger than the decrease of the non-polluting good, and consequently the price.

The impact of a pollution quota on the technical pollution disutility of producing polluting good is given by (11), (14) and (15) as

(19) $$\frac{d(\psi z_2 x_2)}{dz_2} = \psi x_2 + \frac{2\lambda\psi}{3b} z_2 > 0$$

An increase in the allowed pollution quota increases the amount of pollution emitted into the atmosphere and its disutility. Finally, the technical pollution disutility for consuming the polluting good is given by (11), (14) and (15) as,

(20) $$\frac{d(\varphi x_2)}{dz_2} = \frac{2\lambda\varphi}{3b} > 0$$

Unequivocally, an increase in the pollution quota increases the disutility for consuming the polluting good.

Optimal Pollution Quota

Once we have set some comparative statics, we derive the optimal pollution quota. Total derivation of (11) respect to the optimal pollution quota, and considering (11) to (20) we get

(21) $$dW = \left(-\frac{2\lambda}{3} x_1 + \frac{4\lambda}{3} x_2 + \frac{2\lambda}{3} Q - \psi x_2 - \frac{2\lambda\psi}{3b} z_2 - \frac{2\lambda\varphi}{3b} \right) dz_2$$

Taking the coefficient of (21) equal to zero, and solving for the pollution quota we get,

(22) $$z_2^*(2\lambda\psi) = 2\lambda(bx_1 - \varphi) - bx_2(3\psi - 2\lambda)$$

The expression (22) is unequivocally ambiguous, the optimal pollution policy depend on the technical marginal pollution disutility for producing and consuming as well as the marginal cost for abating pollution. In order to guarantee concavity, the second order condition is

(23) $$\frac{d^2W}{dz_2^2} = \frac{4\lambda}{3b}(\lambda - \psi) < 0$$

such that the condition hold when $\psi > \lambda$.

According to (22), the optimal pollution policy depends on the level of technical marginal pollution disutility from production and/or consumption. When both or one of them are sufficiently larger than the unit cost of abating pollution ($\psi, \varphi >> \lambda$), it is straightforward to see that the optimal pollution policy is zero.

On the other hand, when both marginal technical pollution disutilities are sufficiently small, the optimal pollution quota depends on the market size of the polluting and non-polluting goods. In order to clarify the result, from the second order condition (23), $\psi > \lambda$, we assume that the marginal pollution disutility for production is getting close to the unit cost for abating pollution $\psi \to \lambda$, such that $\psi \approx \lambda$. We also assume that the technical marginal pollution disutility for consuming the polluting good tend to be relatively small like $\varphi \to 0$. We can rewrite (22) as

(24) $z^*_2(2\lambda^2) = \lambda b(2x_1 - x_2)$

In this case, the optimal pollution policy depends on the market size for polluting and non-polluting goods. When the market for polluting good is larger than the double of market for non-pollution good, the output produced by the polluting firm is larger than the double of the output produced by the non-polluting firm ($x_2 > 2x_1$). In such a case, the optimal pollution quota is zero ($z^*_2 = 0$). On the other hand, when the market for non-polluting good is larger than the half of the market for polluting good, the output produced by the non-polluting firm is larger than the half of the output produced by the polluting firm ($x_1 \geq x_2/2$). In such a case, the optimal pollution quota is positive ($z^*_2 > 0$).

However, the market size of each good depends on the environmental awareness level. A large environmental awareness means that the optimal polluting good is smaller than the optimal non-polluting good produced.

On the contrary, a small environmental awareness level means that the optimal polluting good is larger than the optimal non-polluting good produced. Formally we can say,

Proposition 1. *In an oligopolistic competition model with different pollution technology and different willingness to consume a homogenous good, the optimal pollution quota set by government is defined as,*

1. *If the technical marginal pollution disutility for consuming and/or producing are sufficiently large (ψ, $\varphi \gg 0$), then the optimal pollution quota is zero ($z^*_2 = 0$).*
2. *If the technical marginal pollution disutility for consuming and/or producing are sufficiently small ($\psi \to \lambda$, $\varphi \to 0$), then the optimal pollution quota would be:*

   a. *$z^*_2 = 0$ if $\gamma \to 0$, then $x_2 > 2x_1$*
   b. *$z^*_2 > 0$ if $\gamma \to \bar{\gamma}$, then $x_1 \geq x_2/2$.*

Intuitively speaking, when both or one of the technical marginal pollution disutilities are sufficiently large (ψ, $\varphi \gg 0$), the government considers the negative externality given by the pollution more than the benefit in consumer and producer surplus, independently of the level of environmental awareness. The government set the strictest pollution policy and the positive impact on technical pollution disutility in production and/or consumption is larger than the lost in consumer and producer surplus.

On the other hand, when the technical marginal pollution disutilities are negligible, the optimal pollution quota would be defined by the level of environmental awareness. When the level of environment awareness is large, the government is concern about the consumer preferences despite the small technical pollution disutility in consumption and production. The benefit of a larger non-pollution good market for consumption and production is superior to the lost in the production and consumption of the cheaper polluting good market. The government sets the strictest pollution quota. We should consider that the marginal pollution disutility for producing is close to the cost for abating pollution, in other words, it is no zero, and a larger market for polluting goods means more pollution for producing. In this case, the government set the strictest policy in order

to reduce pollution and support the people concern about environment despite the lost in consumer a producer surplus.

When the level of environmental awareness and the technical pollution disutilities are negligible, nobody pay attention to the environmental issue, then the government sets a positive pollution quota in order to encourage the production of polluting good, and the consumer and producer surplus despite the increase in the pollution emitted by the polluting firm.

How the environmental awareness level affects the optimal pollution quota set by the government? From (22) we can differentiate respect to the level of environmental awareness level and we get,

$$\frac{dz_2^*}{d\gamma} = a_2' \left[\frac{\lambda + 3\psi}{\lambda^2} \right] < 0$$

An increase in the environmental awareness reduces the optimal pollution quota. The intuition is quite straightforward, when the level of environmental awareness increases the people is not willing to buy polluting goods encouraging the production of non-polluting goods. The government is going to support the environmental concern of the people encouraging the non-polluting firm despite the fall in the consumer surplus and the profits of polluting firm. The government adopts the environmental awareness of the people despite the economic lost.

Conclusions

Environmental awareness is knowledge and perception of the effects of human activity on the natural world. The environmental culture modifies the environment for the benefit or harm of people and nature, in the short, medium and long term. In this sense, a null environmental awareness is manifested in irresponsible and harmful actions on the environment, while a high level of environmental awareness stimulates proactive actions for the benefit of the environment. In this sense, the level of

environmental awareness affects consumer behaviour, and the consumers take responsibility towards the environment.

Due to the uncertain nature of human behaviour, it is very difficult to objectively assess the scope of environmental awareness on the environment. Furthermore, when there is a real gap between the environmental knowledge that people possess and their true behaviour towards the environment. There is no guarantee that a person with reasonable environmental education acts in an ecologically responsible way. However, as a society as a whole, a higher level of environmental awareness is more likely to translate into environmentally friendly behaviour.

The present work develops a theoretical model of partial equilibrium for the market of a homogeneous good, in which two companies, one polluting and the other non-polluting, compete under Cournot conditions. The government sets a conventional pollution quota policy to regulate company emissions, in the presence of a given level of environmental awareness shown by consumers. After calculating the optimal pollution rate, the following environmental policy results can be concluded.

First, if the social damage from polluting is significantly high, the government imposes the maximum possible restriction on the polluting firm. In this way, the government values the damage caused by pollution to the environment and people's health to a greater extent.

Second, if the disutility to be contaminated is negligible; the government may allow the pollutant firm a certain level of emissions, considering to a greater extent the benefits of the companies and the consumer surplus, than harm to a certain extent tolerable and reasonable in the environment. Now, for this case, if the level of environmental awakening shown by consumers is high, the government, although it allows the polluting firm to continue with its emissions, tends to decrease the share to the extent of the degree of environmental awakening of people.

On the contrary, if the level of environmental awareness is small, the government tolerates the emissions of the polluting firm more, increasing the pollution share. In such a way that there is an inverse relationship between the level of environmental awakening of consumers and the amount of pollution imposed on the polluting firm by the government.

Therefore, this work shows the importance of implementing strategic environmental policies that boost the competitiveness of firms and the benefit of consumers when they have a certain level of environmental awareness, which also affects the preservation or deterioration of the environment.

References

Asako, K. (1979). Environmental pollution in an open economy. *Economic Record*, 55 (4), 359–367. https://doi.org/10.1111/j.1475-4932.1979.tb02241.x

Chartand, T. L. (2005). The Role of Conscious Awareness in Consumer Behaviour. *Journal of Consumer Psychology*, 3 (15), 203–210. https://doi.org/10.1207/s15327663jcp1503_4

Constant, K. and Davin, M. (2018). Environmental Policy and Growth when Environmental Awareness is Endogenous. *Macroeconomic Dynamics*, 23(3), 1102-1136. https://doi.org/10.1017/S1365100517000189

Cropper, M.L. and Oates, W.E. (1992). Environmental Economics: a Survey. *Journal of Economic Literature*, 30(2), 675–740.

Dechezleprêtre, A. and Sato, M. (2017). The Impacts of Environmental Regulations on Competitiveness. *Review of Environmental Economics and Policy*, 11 (2), 183–206. https://doi.org/10.1093/reep/rex013

Downing, P.B. and White, L.J. (1986). Innovation in Pollution Control. *Journal of Environmental Economics and Managament*, 13(1), 18–29. Retrieved from http://zhang-zhenyu.com/asserts/syllabus/20171-reading/JEEM 1986.pdf

Eccleston, C.H. and March, F. (2011). *Global Environmental Policy: Concepts, Principles, and Practice*. Boca Raton, USA: CRC Press.

Endres, A. and Rundshagen, B. (2013). Incentives to Diffuse Advanced Abatement Technology Agreements. *Environmental and Resource Economics*, 56(1), 177–210. https://doi.org/10.1007/s10640-012-9596-9

Golombek, R. and Hoel, M. (2006). Second-Best Climate Agreements and Technology Policy. *Advances in Economic Analysis & Policy*, 6(1), 1–28. https://doi.org/https://doi.org/10.2202/1538-0637.1472

Golombek, R. and Hoel, M. (2008). Endogenous Technology and Tradable Emission Quotas. *Resource and Energy Economics*, 30(2), 197–208. https://doi.org/10.1016/j.reseneeco.2007.08.003

Gupta, N. (2014). Environmental Awareness Policies and its Effectiveness: A Study of Ludhiana City (India). *Environment and Urbanization ASIA*, *5* (1), 147–160. https://doi.org/10.1177/0975425314521547

Jung, C., Krutilla, K. and Boyd, R. (1996). Incentives for Advanced Pollution Abatement Technology at the Industry Level: an Evaluation of Policy Alternatives. *Journal of Environmental Economics and Managament*, 30(1), 95–111. https://doi.org/https://doi.org/10.1006/jeem.1996.0007

Kneese, A. and Schultze, C. (1975). *Pollution, Prices and Public Policy*. Washington, USA: The Brookings Institution.

Kollmuss, A and Agyeman, J. (2002). Mind the Gap: Why Do People Act Environmentally and What Are the Barriers to Pro-Environmental Behavior?. *Environmental Education Research*, 8 (3), 239–260. https://doi.org/10.1080/13504620220145401

Kolstad, C. (2016). *Intermediate Environmental Economics*. New York, USA: Oxford University Press.

Koźluk, T. and Timiliotis, C. (2016). Do environmental policies affect global value chains?: A new perspective on the pollution haven hypothesis. *OECD Economics Department Working Papers*, 1282. https://doi.org/10.1787/5jm2hh7nf3wd-en.

Lahiri, S. and Ono, Y. (2000). Protecting environment in the presence of foreign direct investment: tax versus quantity restriction. *Economics Discussion Papers,* University of Essex.

Liu, H. and Lin, B. (2017). Cost-Based Modelling of Optimal Emission Quota Allocation. *Journal of Cleaner Production*, 149(1), 472–484. https://doi.org/10.1016/j.jclepro.2017.02.079

Malueg, A. (1989). Emission Credit Trading and the Incentive to Adopt New Pollution Abatement Technology. *Journal of Environmental Economics and Managament*, 16(1), 52–57. https://doi.org/https://doi.org/10.1016/0095-0696(89)90045-4

Marin, D.A. (1978). The Choice of Efficient Pollution Policies : Technology and Economics in the Control of Sulphure Dioxide. *Journal of Environmental Economics and Management*, 5(1), 44–62. https://doi.org/https://doi.org/10.1016/0095-0696(78)90004-9

Markusen, J.R., Morey, E.R. and Olewiler, N.D. (1993). Environmental policy when market structure and plant locations are endogenous. *Journal of Environmental Economics and Management*, 24 (1), 69–86. https://doi.org/10.1006/jeem.1993.1005

Markusen, J.R., Morey, E.R. and Olewiler, N.D. (1995). Competition in regional environmental policies when plant locations are endogenous. *Journal of Public Economics*, 56 (1), 55–77. https://doi.org/10.1016/0047-2727(94)01419-O

Milliman, S.R. and Prince, R. (1989). Firm Incentives to Promote Technological Change in Pollution Control. *Journal of Environmental Economics and Management*, 17(1), 247–265. https://doi.org/10.1016/0095-0696(89)90019-3

Mills, E. and White, L.J. (1978). Government Policies toward Automotive Emissions Control. In A. Friedlander (Ed.), *Approaches to Controling Air Pollution*. Cambridge, USA: MIT Press.

OECD (2017). *Tackling Environmental Problems with the Help of Behavioural Insights*. Paris, France: OECD Publishing.

Requate, T. and Unold, W. (2001). On the Incentives Created by Policy Instruments to Adopt Advanced Abatement Technology if Firms are Asymmetric. *Journal of Institutional and Theoretical Economics*, 157(4), 536–554.

Requate, T. and Unold, W. (2003). Environmental Policy Incentives to Adopt Advanced Abatement Technology : Will the True Ranking Please Stand up ? *European Economic Review*, 47(1), 125–146. https://doi.org/https://doi.org/10.1016/S0014-2921(02)00188-5

Russell, C.S. (1979). What Can We Get from Effluent Charges? *Policy Analisys*, 5(2), 155–180.

Sandoval Bravo, S. and Espinosa Ramirez, R.S. (2020). Cuotas de Contaminación y Tecnología Medioambiental Diferenciada en Presencia de Inversión Extranjera Directa. *Contaduría y Administración*, 66(2), 1–18. https://doi.org/http://dx.doi.org/10.22201/fca.24488410e.2021.2645

Siegel, L., Cutter-Mackenzie-Knowles, A. and Bellert, A. (2018). Still 'Minding the Gap' Sixteen Years Later: (Re)Storying Pro-Environmental Behaviour. *Australian Journal of Environmental Education,* 34 (2), 189–203. https://doi.org/10.1017/aee.2018.32

Stevens, C. (1993). Do environmental policies affect competitiveness?. *OECD Observer*, 183, 22-25.

UNEP (2019). *UN Environment Programme - Programme Performance Report 2018*. Retrieved from https://wedocs.unep.org/bitstream/handle/20.500.11822/27734/PPR_2018_FINAL.pdf

Weng, Y., Hsu, K.C. and Liu, B.J. (2019). Increasing worldwide environmental consciousness and environmental policy adjustment. *The Quarterly Review of Economics and Finance*, 71, 205–210. https://doi.org/10.1016/j.qref.2018.08.003

CHAPTER THREE

International Tourism Demand in Mexico: Structural Breaks and Public Policy Implications

Evangelina Cruz Barba
Javier Emmanuel Anguiano Pita

Introduction

With the reallocation of productive resources in Mexico in the 1970s, mainly from the agricultural sector, a set of policies was initiated to attract Foreign Direct Investment (FDI) through fiscal incentives that generated economic, political and legal conditions to be applied to the productive sectors, which included tourism. The need for hotels with international standards led foreign operators to start investing with Mexican partners in the late 1970s. By 1983, there were already 12 foreign hotel chains, in addition to the national ones (Martínez, 2008), to meet the demands of image of an international tourist destination "Sun and sand", as the main tourist product of Mexico. This is how Mexico received international recognition primarily to its beaches and weather conditions. This policy of foreign investment in hotels took force with the oil crisis of 1982, and the entry into force of the General Agreement on Tariffs and Trade (GATT) in 1986. Indeed, the

neoliberal process generated a dynamism of tourism due to the minimal protectionist barriers of the Mexican State (Clancy, 1999).

Given the growing international tourism demand and the importance of this economic activity, mainly for emerging economies due to the inflow of foreign exchange, tourism can be related to contemporary theories of economic policy and development (De Kadt, 1979; Britton, 1982; Clancy, 1999; Harrison, 2015). Particularly in Mexico, tourism is a very important sector for the country's economy because it represents an average of 9.4% of GDP (Brida, Sánchez, Risso & Schubert, 2008).

When tourism is analyzed, the economic theory in general, and the international trade theory in particular, becomes a challenge (Crouch, 1994, p.104). This is because tourism is affected by multiple factors, such as the marginal propensity to travel, the decision of how much to spend on a trip, among others. These multiple factors make it difficult to specify the behavior in an aggregate demand model. Therefore, several studies start from the assumptions of the international trade theory. They identify tourism as a service industry and "invisible trade" (Gray, 1966). In this way, international tourism figures highlight the relevance of studying the demand function, being the elasticity of high income the main reason why trips depend to a great extent on the economic context and expectations (Smeral, 1988).

However, in times of economic instability, households tend to reduce their consumption of international travel. Moreover, there are theoretical arguments to explain the choice of tourist destinations, for example, unexpected events such as natural disasters generate negative impacts on tourism demand (Rosselló, Becken & Santana-Gallego, 2020). Virus epidemic diseases (such as SARS in 2002 and H1N1 in 2009) have a significant impact on global tourism trends. Outbreak episodes have coincided with economic disturbances in the last 53 years, for example during the H1N1 crisis in 2009. Tourist arrivals experienced a decrease depending on the distance to the region of origin of the virus from 1980 to 2019, meanwhile:

"The total lost tourist arrivals worldwide from 1980 to 2019 amounted to 57 million during the epidemic outbreaks. Lost tourism spending worldwide in times of epidemic outbreaks during this same period reached 95 US$ billion (bn). In relative terms, total lost tourism spending in a time

of epidemic crisis was 0.23% of the world GDP" (Škare, Riberio & Porada-Rochoń, 2021, p.2).

Having faced this scenario of international tourism crisis, it is considered relevant to analyze Mexico's international demand. Past crises have shown that tourism is a resilient sector, but it is necessary to understand the complexity of the sector in its dynamics of interconnected with public policies. Due to the seasonality of tourism and the high vulnerability to exogenous factors, it is not possible to measure the impact of all variables affecting tourism demand. In this context, this study follows the structural break procedure of Bai and Perron (1998, 2003a, 2003) to analyze the international tourism demand in Mexico, to integrate statistical data from the 1980-2019 period, and to indirectly identify the impact of public policies on tourism exports. The purpose is to reflect on the crisis caused by COVID-19 so that politicians along with tourism professionals rethink the scenarios and effects of public policies in order to attract international tourism segments with greater emphasis on sustainability. This follows the ideas from Hall (1995) about the latest thinking in political debates, based on an effort to learn from the best of the past, inspired by a commitment to more innovative and inclusive goals for the future.

The current COVID-19 pandemic has changed all international travel forecasts. It has given travel bans and the closing of borders from international tourism to healthcare. The UNWTO (2019) estimated that international tourism will decrease between 20% and 30% in 2020. Nevertheless, the loss has been greater, breaking with the estimated forecast of international tourist arrivals with an average annual growth rate of 3.3 % in the period 2011-2030 given the sustained increase since the 1980s in the world, with a record of 287 million tourists (WEF, 2019).

Pandemics have long exerted important forces on politics, communities, the economy, and human attitudes toward nature that directly impact tourism (Hall, Scott & Gössling, 2020, p. 590). Currently, "the health crisis caused by COVID-19 has placed tourism before a magnifying mirror that highlights the defects that it has been trying to hide for a long time" (Mantecón, 2021, p. 28). For example, sustainability, where each country responds with national policies. In this matter, countries are committed to transforming the sector, with special reference to sustainability tourism.

Meanwhile in Mexico, according to (Santibañez-Aguascalientes, Borja & Ardisson, 2021) in tropical regions such as the southern Gulf of Mexico, there are no legal guidelines to assess the quality of the seabed.

Even when the World Economic Forum (WEF, 2019) recognizes the endowment of potential factors for the Mexican tourism sector, with advantages compared to other countries, since it ranks number one in natural resources and number ten in cultural resources and travel of businesses from 140 countries analyzed. In fact, Mexico ranks eighth in the reception of international tourism in the world, but not in income. Furthermore, from the commercial opening, "the most significant impact of NAFTA on tourism is probably indirect for Mexico, within the framework of a broader business market" (Clancy, 2001, p.126), which can help to overcome the crisis caused by the pandemic. It strengthens businesses and FDI, since "FDI plays a positive role in attracting foreign tourism flows and expenses to the destination country" (Zhang and Jensen, 2007, p. 229).

As one of the most important industries of the economy, the tourism industry in Mexico has had significant growth in the last decades due to several factors associated with public policy. First, the contribution of Foreign Direct Investment (FDI) derived from the former North American Free Trade Agreement (NAFTA). Second, it should be noted that Mexico shares an important border with the United States, and without a visa policy, the tourist flow from the United States to Mexico is high. Indeed, according to tourism statistics (OECD, 2017), more than 80% of the total international tourism received by Mexico is from the USA, Canadians rank in second place, and according to Laber (1964, p.335) both countries consider geographic distance as a variable that determines the rate of visits.

The rest of the chapter is set as follows. Section 2 provides some theoretical background and a review of previous studies about the determinants of international tourism demand and the effects of COVID-19 pandemic in tourist flows. Section 3 describes the chosen methodology and the data employed. Section 4 reports the empirical results and discusses its implications in terms of public policy and Section 6 concludes with policy and social implications.

Literature review

Tourism has multiple effects on the economy of a country such as those related to the balance of payments, gross national product, employment, regional development, the incidence in tax revenues, and FDI (Li, Mahmood, Abdullah & Chuan, 2013). Therefore, to model tourism demand the bulk of literature has proposed the income of the origin country/region and the own price destination as the most commonly considered determinants (Gray, 1966; Lim, 1997, 1999; Crouch, 1994; Peng, Song, Crouch and Witt, 2014; Song, Qiu & Park, 2019, among others).

Based on a follow-up meta-analysis of tourism demand carried out by some authors (Crouch, 1994; Lim 1997,1999; and Peng et al., 2015), it is identified that in most econometric models, the number of visitors is used as a dependent variable (Table 1), and it is also important to take into account the flow of travelers between origin and specific destinations.

Table 1
Exploratory variables

Crouch (1994)	Lim (1999)	Peng et al., (2015)
a) Income	a) Income	a) Income
b) Price	b) Transportation Costs	b) Price
c) Exchange Rate	c) Relative Tourism Prices	c) Exchange Rate
d) Cost of Transportation	d) Dummy	c) Dummy (structural changes/ effect of travel distance)
e) Promotion Expenses		
f) Dummy		

Source: Authors based on Crouch (1994); Lim (1999) and Peng, et al., (2015)

The sensitivity of these variables may vary depending on the nationality of the tourists, somehow influencing trade agreement, cultural differences, and the impact of promotion. According to the variables presented above, it is clear that the adoption of a decision to consume a "tourist product" is a function of many factors that cannot be modeled. Therefore, "the overall

average income elasticity of international tourism demand is 2.526. This indicates that, based in meta-analysis, the majority of international travel is clearly in the luxury" (Peng et al., 2015, p. 625). Besides, Crouch (1994) found that tourists from developed countries tend to view international tourism as a lesser luxury than countries with emerged economies. Such is the case of the perception of US tourists to Mexico due to the income of the country of origin.

Distribution of the international tourism in the United States is around 63% to rich countries (Zhang and Jensen, 2007, p.228). These findings do allow us to assume that tourists from the United States who visit Mexico are mostly people from the American lower middle class. Also, according to Monterrubio and Mendoza-Ontiveros (2013) *spring break* travel is a growing market, and Mexico has been identified as a popular destination for North American students' spring break who travel primarily to Los Cabos, Cancun, Puerto Vallarta, and Acapulco as top international destinations since the 1970s.

A global scheme of tourism flows is provided in international tourist arrivals between 94 countries (Mexico is included) from 1995 to 2012. Yang, Liu & Li (2019) show with gravity models that geographical distance and strong socio-economic connections still play a dominant role in shaping the flow patterns of international tourists. However, they show the dynamic side of CD (Cultural Distance) by documenting a decrease in the negative effect of CD at the beginning of the 21st century, due to the expansion of international trade and the use of the Internet, which contributed to dilute the risk and uncertainty of international tourists. Indeed, international trade contributes favorably to the convergence of consumers between the country of origin and destination. This causes the needs of tourists to be satisfied even in a culturally different environment, such as the United States and Mexico, moderating the cultural disadvantages between them.

Associated with globalization, the interdependence of the market has become a subject of study of demand. Tourism demand in a destination tends to be affected by the demand for alternative destinations due not only to cultural and environmental similarities and geographic proximity, but also to the similarity in economic determinants (Song et al., 2012) like

the income and price elasticity. In this sense, Stronge & Redman (1982) estimated the demand functions of tourism, and found no evidence that United States tourists substitute Mexico for more distant destinations as transportation costs increase. Border and inland Mexican tourism are income elastic but inelastic with respect to Mexican prices.

Ever since Gray (1966) analyzed international travel between the United States and Canada, estimating the elasticity of income and the exchange rate of import demand in the international travel account, Laber (1969) tried to demonstrate that the volume of tourism received by Canada from the United States impacts income significantly, migration, and distance.

It is reasonably inferred that distance is an important factor that increases the rate of visitors. According to Laber (1969), it can be estimated that U.S. tourists that visit Canada do so because the average journey distance to the U.S. is relatively short. Additionally, it identifies the advantages of stimulating "tourism" in underdeveloped countries and regions in the end of the 1960s. It suggests that both the United States and Canada appreciate unique travel attractions, natural areas, and a favorable climate in Mexico as a destination in addition to NAFTA. In this sense, Brida, Risso, and Sanchez (2008) argue that if the Mexican government invests in tourism facilities and enforces sustainable laws, tourism demand to Mexico will benefit from US revenues.

The empirical results of the causality tests between the tourist demand between Canada, Mexico, and the United States carried out by Ongan and Gocer (2020) indicate that the effects of international tourism on international trade are slightly higher than the effects of international trade on international tourism. Specifically, while a 1% increase in the number of Canadian tourists to the US increases US exports to Canada by 0.61%, the same percentage increase in the number of Mexican tourists to the US Increase US exports to Mexico by 0.36%. Similarly, a 1% increase in US exports to Canada increases the number of Canadian tourists to the United States by 0.89%.

Regarding COVID-19 pandemic, changes are expected in international tourist flows because not all countries have been subjected to the same sanitary restrictions. Therefore, we can say that another variable

that impacts the demand for international tourism is incorporated according to the public policy of each country: the restrictions on the entry to international tourists. Škare, Riberio & Porada-Rochoń (2021) test the impact of COVID-19 on the travel tourism industry worldwide using an annual dataset of 185 countries for the period from 1995 to 2019. They estimated parameters that reflect the empirical link of past pandemic episodes from 1980 to 2019, as well as the empirical link of the proxy for government responses, the country's/region's economic policy responses, the share of export in the GDP, the travel and tourism sector share in the GDP, the phase of the financial cycle, private debt share in the GDP, and tourist arrivals under different scenarios. They concluded that pandemic crises have long-lasting negative effects on the tourism industry and economy. The estimated negative effects are far beyond those observed during past pandemics. Policy makers need effective contingency plans to revive the tourism industry with cooperation rather than competition to minimize the costs of COVID-19.

Bickley et al., (2021) suggest that the implementation of policies by countries with high government efficiency and globalization is a by-product of commitment to existing trade agreements, such as the ability of a government to deal with a pandemic through its health system. Based on the results of 185 countries, the authors suggest that in response to COVID-19, more globalized countries, such as the US, are more likely to adopt international travel restriction policies. However, countries with high governmental efficiency as well as globalization did so through the formal integration of trade policies.

In addition, during the COVID-19 pandemic there is a feeling of insecurity on every country. There is a new risk scenario for international tourism flows that depends on the public policy in each country in terms of restrictions on the arrival of international tourists. For this reason, this issue should also be put on the public policy agenda. For instance, a study of Villacé-Molinero et al., (2021) was carried out during two stages. In the first one, using an online survey of 1,075 travelers that includes 52 nationalities, the travelers chose to keep or cancel their travel plans according to a perception of a travel risk. In the second stage, it was at the beginning of the de-escalation in Europe, with an interview on security measures to 28

international experts in the hotel industry. These results help in generating strategies to reactivate tourism and to understand the post-COVID-19 risk scenario, because this research accounts for people's behavior and willingness to travel in pandemic times.

Until the associations are merely suggestive, Hale et al. (2021) identify causal effects of government policies, because data suggests that there could be a strong association between the government tracker indices and measures of behavior. Therefore, the coordination of tourism companies, citizens and local governments is important, given the difference in interests between them. There is a collective risk dilemma behind these decisions. The costs for regions by restricting their mobility are heterogeneous, given that each region's dependence on tourism is diverse (Chica, Hernández & Bulchand-Gidumal, 2021).

From the analysis of ten countries with different coping strategies, and a sample of 518 potential international tourists, Rasoolimanesh et al. (2021) identify that the effects of the image of tourist destinations generated by the COVID-19 pandemic have to do with trust, the health system, and solidarity. Another similar study from Kim, Hall & Bonn (2021) shows that value has the greatest effects on attitude. It is followed by the personal and social norm on biosafety to travel during the pandemic, and personalities significantly moderate the links between attitude, personal norm, and behavior.

Considering the attitude of tourists, environmental problems continue in different ways so far on the beaches. Such is the case of some of the main tourist beaches in Chile, where the daily accumulation rates of face masks were monitored on a beach in north-central Chile with values substantially higher than the daily accumulation rates reported in urban streets. This is due to the high density of visitors to the beach during the summer tourist season. For this reason, it is necessary to implement educational campaigns to recommend the proper use and disposal of face masks, the prevention of waste, the reduction of single-use waste and the improvement of environmental behaviors (Thiel et al., 2021).

Malaysia, like Mexico, is renowned for its tourism activity. It is one of the countries with the highest number of tourists in the coastal areas. However, the negative impacts of such activities are recognized. Hanafiah,

Jamaluddin & Kunjuraman (2021) developed qualitative interviews with visitors, local resident, government official, and commercial operators. They found that the impact factors highlight the strong feeling of community participation and a sense of community that facilitates and minimizes the negative impact of tourism development and activities, which is why it is necessary to join forces to formulate tourism policies that mitigate the adverse effects of tourism activities on the coast.

The changes in tourism as a result of COVID-19 pandemic will be uneven in each country. Some destinations will reconsider the nature of their tourism industry and will focus more on local and more sustainable forms of tourism, without substantial institutional and governmental interventions. They are currently overwhelmed with saving lives and creating the conditions to reactivate national economies and educational systems. The focus on tourism will be business as usual. There are not enough stakeholders in the tourism sector to question the sustainability of the success defined by growth in numbers visitors or increased consumption of materials to look forward to transformative change driven from within (Hall, Scott & Gössling, 2020).

At this point, it is clear that the relationship between theory and empirical evidence is in order. The main factors involved in the tourism demand in Mexico, are prices and factor endowments. It means Mexico has a comparative advantages respect to the United States as a tourist destination. This difference may encourage conditions to improve Mexico's public policy to improve of the quality of tourist services.

Methodology and date

The framework developed by Bai and Perron (1998, 2003a, 2003b), hereafter referred to as the BP procedure, allows to endogenously determine the existence of structural breaks or regimes using least squares estimations. In other words, for the proposed method it is not necessary to know the timing of the breaks in advance. Following Cró and Martins (2017) in this study we regress Mexico international tourist arrivals series on a constant

and test for structural breaks in the constant[1]. The model can be expressed by the following equation:

$$y_t = \beta_j + \varepsilon_t \ , \quad t = T_{j-1}, \dots, T_j \tag{1}$$

for $j = 1, \dots, m + 1$, where y_t refers to the international tourism arrival series in period t and β_j $(j = 1, \dots, m + 1)$ is the mean of a dependent variable that varies in the j-th regime. The m-partition of the sample, $(T_1, \dots, T_m)$, represents the potential breakpoints for the different regime, usually defined by convention as $T_0 = 0$ and $T_{m+1} = T$. The selected procedure can identify multiple structural changes using the following algorithm: For each m-partition, $(T_1, \dots, T_m)$, the least squares estimate of β_j are obtained by minimizing the sum of squared residuals (SSR):

$$SSR_T(T_1, \dots, T_m) = \sum_{j=1}^{m+1} \sum_{t=T_{j-1}+1}^{T_j} \left(y_t - \beta_j\right)^2 \tag{2}$$

where SSR is calculated first across all time points in a given segment 1 to $m+1$. Also, $SSR_T(T_1, \dots, T_m)$ represent the sum of squared residuals in m-partition and $(T_1, \dots, T_m)$ are specific to the estimated potential break dates. Being the regression coefficient estimates based on a given m-partition denoted by $\hat{\beta}(\{T_1, \dots, T_m\})$ and substituting these into equation (2) gives the estimated break points resulting from the following minimization problem:

$$\left(\widehat{T}_1, \dots, \widehat{T_m}\right) = \arg \min_{T_1, \dots, T_m} SSR_T(T_1, \dots, T_m) \tag{3}$$

To solve the minimization problem of Equation (3), Bai and Perron (2006) developed an efficient algorithm based on the principle of dynamic programming. Once we solved the problem, it is straightforward to compute the corresponding least-square regression parameter estimates as $\hat{\beta} = \hat{\beta}(\{\widehat{T}_1, \dots, \widehat{T_m}\})$.

---

[1]   We also tested for the existence of a structural break in a linear trend and in a constant and a linear trend and obtained similar quantitative results. The corresponding test results are available on request from the corresponding author.

In order to determine the exact number of breaks, Bai and Perron (2003a) suggest the application of the three following F type tests: i) $SupF_t(m)$ test; ii) *"double maximum"* statistics given by $UD_{max} = \max_{1 \leq m \leq M} SupF_t(m)$ and $UD_{max} = \max_{1 \leq m < M} W_m SupF_T(m)$; and the sequential $SupF_T(m + 1 \mid m)$ test. The procedure to determine the existence of structural changes and to identify the number of breaks can be summarized as follows: First, let $SupF_T(m)$ indicate the *F*-statistic for testing the null hypothesis of no structural breaks against the alternative hypothesis that there are $m = b$ breaks, which are selected using Equation (3). Second, use the "double maximum" statistics to test the null hypothesis of no structural breaks against the alternative hypothesis of an unknow number of breaks given an upper bound, M^2. Third, use the $SupF_T(m + 1 \mid m)$ statistic to test the null hypothesis of m breaks against the alternative hypothesis of *m+1* breaks. Fourth, see the double maximum statistics to know if at least one break is present. Finally, see the results of the sequential test and define the number of breaks at a determined level of significance.

Data and descriptive statistics

In order to study the presence of structural changes in the series of international tourist arrivals to Mexico, we collect monthly data from 1980 to 2019. The series was retrieved from the Economic Information System (SIE) of Bank of Mexico (https://www.banxico.org.mx/SieInternet/default-English.do). The empirical analysis considers seasonally adjusted data using the X-13 ARIMA procedure and the logarithmic transformation of the series values.

The descriptive statistics of the data are presented in Table 1, while the data are demonstrated graphically in Figure 1. The table shows that the mean number of international arrivals to Mexico is 881,482 thousand people per month with a standard deviation of 453,420. The p-value of the Jarque-Bera normality test suggests that the series does not follow a

---

2 The maximum number of breaks (*M*) are indirectly analyzed considering a minimal fraction of the sample that depends on the total number of observations. In this study, we consider a maximum number of five breaks giving trimming of 15 percent of the total number of observations in each subsample.

normal distribution. Figure 1 shows a visible upward trend in the series during the period analyzed. It also shows that the values of the international tourist arrivals to Mexico oscillated between 310,191 to 2'028,284 people. Finally, the figure also suggests the possible existence of multiple structural breaks in different segments of the period analyzed.

Table 2

Descriptive statistics and Jarque-Bera normality test

Statistic	TOUR
Mean	881.4825
Std. Dev.	453.4204
Min	310.1918
Max	2028.2840
Skewness	0.8627
Kurtosis	3.0769
Jarque-Bera	59.6641
Probability	0.0000
Observations	480

Notes: Descriptive statistics and Jarque-Bera normality test consider data in levels. The number of international tourist arrivals to Mexico is expressed in thousands of people. TOUR refers to the international tourist arrivals to Mexico. The null hypothesis of the Jarque-Bera test is that the series are normally distributed. Source: Authors own elaboration with statistical data from Bank of Mexico.

Figure 1
Monthly international tourist arrivals to Mexico, 1980-2019
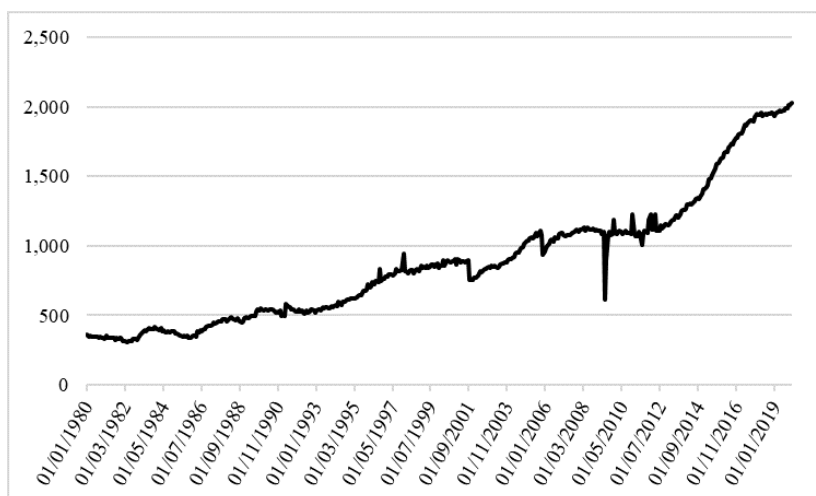
Notes: The monthly international tourist arrivals to Mexico consider data seasonally adjusted using the X-13 ARIMA procedure. Source: Authors own elaboration with statistical data from Bank of Mexico.

Empirical results

The results of the BP multiple structural breaks test are presented in Table 3. The table shows evidence of the existence of at least four structural breaks in the international tourist arrivals to Mexico. In particular, the table shows evidence for breaks during 1987M03, 1995M09, 2004M07 and 2014M01. The finding of the existence of multiple breaks has important implications in econometric analysis. In particular, these findings pose certain limitations to the use of conventional econometric techniques. Because of that limitation, in this study we focus only on give some rationale of the structural changes found.

Table 3
Bai-Perron sequential multiple structural breaks test

Variable	Break test	*	F-statistic	Critical values	Break dates	Rationale
International tourist arrivals to Mexico	0 vs 1	*	1571.2180	8.5800	1987M03	Institutional changes and new bodies and tourism regulations.
	1 vs 2	*	817.2675	10.1300	1995M09	NAFTA and modernization of tourism policy.
	2 vs 3	*	813.7002	11.1400	2004M07	Project diversification and strengthening of the Magic Towns Program.
	3 vs 4	*	720.1774	11.8300	2014M01	Recovery from 2008 global financial crisis.
	4 vs 5		0.0000	12.2500		

Notes: The tests assume that only a maximum of five breaks can occur. The minimum number of observations for each segment was set at h = 0.15. Critical values at a 5 per cent level are interpolated from Bai and Perron (2003). The null hypothesis of the test supposes the contrast of the existence of l vs $l+1$ breaks. If the F-statistic is greater than the critical values we can reject the null hypothesis. An asterisk (*) denote the significance of the break at the 5 per cent level. Source: Authors' own estimates with data obtained from Bank of Mexico.

The first break date found in 1987 could be related to institutional changes, new public bodies and regulations were created to meet the tourist demand, such as travel agency regulations; tourist guides; car rental companies; lodging establishments such as camps, mobile home stops, and charter flights were authorized during the government of Miguel de la Madrid (1982-1988). These institutional changes favor the rise in international tourism demand, which is additional to the country's entry into the GATT.

Later, with the approval of NAFTA in the United States Congress, lower domestic savings, as well large and growing current account deficits helped Mexico to be perceived as an attractive investment destination for the international financial community that supplemented savings with its funds. Mexico was an example of how market-oriented reforms were the passport to overcome economic backwardness. Then, the depletion of international reserves caused by the political unrest of 1993 forced a devaluation in December 1994 that caused the suspension of access to foreign savings (Olvera, 2015, p.9).

The second structural change occurred in 1995, and could be the result of "tourism modernization" policies implemented during the government of Carlos Salinas de Gortari (1989-1994). It strengthened the nautical tourism with the implementation of marinas infrastructure in Puerto Vallarta, Manzanillo, among other ports. It also created public organizations to run the programs: "Northern Border," "Colonial Cities," and "Mundo Maya." These actions by the Mexican government further strengthened the demand for tourists from the United States. Thus, tourism had a sustained growth.

The third structural change of 2004 is due to a project for diversification of tourist markets at an international level. The public policy focused on the strengthening of the Magic Towns Program, attention on improving the quality of the service, which implies quality in tourism education. It focused on marketing the quality of the touristic service in Mexico, which generated an increase in international visitors. However, the North American demand continued to prevail, maybe because demographic analysis has found that heritage tourists, including those who specifically visit World Heritage sites, have higher levels of education than those who participate in other types of tourism activities. There is a strong presence of domestic tourists at the analyzed American cultural site, as part of the historical tradition in the US. Given the strong discourse of nationalism in American tourism, approximately two-thirds of the visitors to each cultural site visited had at least a university degree (Ioannides & Timothy, 2010, cited in Adie and Hall, 2017, p.72).

These characteristics of visitors to cultural sites, corroborate the importance of generating tourism policy to attract tourism that values the cultural

attractions of Mexico, and not only the beach. It is important that the Mexican government generates the conditions from the educational system itself in tourism to support the needs of international tourism, because it is not only about increasing the number of professionals dedicated to tourism, but to know the characteristics of international tourists. The academic training in the highest level of tourism in the world that is offered in a country is a function of its political system (Echtner, 1995, p.130).

The third structural break in 2004, even though according to the Summary of the Annual Report of the Bank of Mexico (2004, p. 9), is related to investment that represent a high dynamism that registered a significant increase in exports of goods and services, characterized by significant strength in external demand, particularly from the United States. The indicators related to the business climate and the level of confidence that *Banco de México* has in the manufacturing sector were strengthened.

Additionally, the collapse of Lehman Brothers in September 2008 in the United States, caused the contraction of world trade and caused an international financial crisis. In Mexico, the year 2014 represented a rise in international tourism. This happened after a policy process to reinforce tourism, added to the financial fragility inherent in financial systems. Even though it had been perceived that Mexico was present in the international news due to capital scandals derived from human rights violations and acts of corruption at the highest levels of government (Olvera, 2015), these had a positive impact on international tourism demand, as they were attracted by the parity of the currency generating a fourth structural break.

These findings of structural breaks show the relationship between public policies and international tourism demand. Apparently, the policies that Mexico has implemented in the COVID-19 pandemic have been lax. In addition to this, the tourism par excellence in Mexico continues to be of "Sun and Sand." Mexico is perceived in the world as a place where they can do what is not allowed in other countries. There are minimal sanitary restrictions on Mexican beaches. From 2020 to April 2021, a total of 6 million 040 thousand 840 tourists arrived in the Mexican Caribbean. 3, 119, 802 were national and 2,921, 038 were international (UNWTO, 2021). According to the total international traveler account, tourism seems to have a speedy recovery.

The main conclusions of the empirical analysis can be summarized as follows: 1) there is evidence of the existence of multiple structural breaks in international tourist arrivals to Mexico during the period analyzed; 2) the structural changes found could be related to institutional and public policy changes in the country; 3) the findings have important implications for the current tourism crisis due to the COVID-19 pandemic.

Discussion and Conclusions

In this chapter, we use the Bai and Perron (1998, 2003a, 2003b) multiple structural break method to identify the exact number and dates of break-points in international tourism arrivals to Mexico during the period 1980 to 2019. The use of this method contributes in two ways to the literature related to crisis in the Mexican tourism sector. First, this method allows us to solve a gap in the tourism literature related to the correct allocation of structural changes in international tourism demand, ensuring that the estimated results are not biased. Second, this method can be an important tool for policy makers providing useful information to develop adequate policy responses during crisis events.

In pandemic times, it is necessary to rethink development strategies for this resilient sector that has high fixed costs for its operation. Since the 1980s, Stronge and Redman (1982) identified that there is no evidence that US tourists substitute Mexico for more destinations. Tourism has been a sector especially affected by the decisions that governments have taken, given the impact it generates in the balance of payments of a country. Particularly, the current crisis has affected all productive sectors. The overall decline in capital investment in all regions will reshape the tourism industry worldwide. The level of strength in the restructuring process will depend on the pandemic dynamics and the scenarios in place. Capital investments in the travel and tourism industry show a high level of volatility. Risk condition realization, in the form of exogenous factors (pandemic outbreaks, terrorism, environmental disasters) or endogenous factors (financial and business cycles) will result, on average, in a –15 to –20

percentage points drop in the level of capital investments in the tourism industry (Škare et al., 2021, p.12).

The international analysis of travel restrictions in the world's major tourism destinations since the COVID-19 outbreak conducted by Seyfi, Hall & Shabani (2020, p.9) suggests that the decision making process of governments in tourism is linked to the political and economic dimensions of each country. For example, the restrictions on international tourism in Mexico are perceived as lax compared to other European countries. These sanctions are limited to the suspension of 17 international routes and the reduction of 23 flights. This includes a 40% reduction in scheduled flights to Europe without considering the visa or the 14-day quarantine that other countries took into account.

This situation places Mexico as a destination to visit in the world. However, it is urgent to understand how it affects focusing attention on an image of products such as "Sun and Sand," and the urgency of improving tourist destinations after COVID-19 pandemic with other natural mountain and cultural products. The promotion that includes health safety and the commercialization of culture needs to be emphasized, given the place that Mexico occupies in the international ranking of natural and cultural resources. Although international promotion has been given to the "*Pueblos Mágicos*" project, this one is not enough to promote Mexico's tourism potential. This is due to the wide competition for beautiful towns around the world.

It is necessary to generate public policies, which have health security and are socially responsible, that guide towards sustainable tourism. They need to guarantee the carrying capacity in the short /long term, and therefore the social distance in tourist places. It is not enough to generate policies to increase demand from North America. The sustainability of cultural heritage is a complex issue and is rarely measured. This is due to the lack of indicators such as the educational level of tourists. This information can contribute to generate better policies for the sustainability of tourism heritage that guarantee its care. These actions are challenging because it also depends on the local Mexican context.

References

Adie, B., & Hall, C. (2016). Who visits World Heritage? A comparative analysis of three cultural sites. Journal Of Heritage Tourism, 12(1), 67-80. https://doi.org/10.1080/1743873x.2016.1151429.

Bai, J., & Perron, P. (1998). Estimating and testing linear models with multiple structural changes. *Econometrica*, *66*(1), 47-78. https://doi.org/10.2307/2998540.

Bai, J., & Perron, P. (2003a). Computation and analysis of multiple structural change models. *Journal of Applied Econometrics*, *18*(1), 1-22. https://doi.org/10.1002/jae.659.

Bai, J., & Perron, P. (2003b). Critical values for multiple structural change tests. *The Econometrics Journal*, *6*(1), 72-78. https://doi.org/10.1111/1368-423X.00102.

Bai, J., & Perron, P. (2006). Multiple Structural Change Models: A Simulation Analysis. In D. Corbae, S. Durlauf, & B. Hansen (Eds.), *Econometric Theory and Practice: Frontiers of Analysis and Applied Research* (pp. 212-238). Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9781139164863.010

Bank of Mexico (2004). Summary of the Annual Report of the Bank of Mexico. Recuperado el 6 de julio de 2020 de: https://www.banxico.org.mx/publications-and-press/annual-reports/%7BACD11A2A-B759-D502-7693-9F78A675F0AE%7D.pdf.

Bickley, S. J., Chan, H. F., Skali, A., Stadelmann, D., & Torgler, B. (2021). How does globalization affect COVID-19 responses?. *Globalization and Health*, *17*(1), 1-19. https://doi.org/10.1186/s12992-021-00677-5.

Brida J.G., Risso, W.A., & Sanchez, C. J (2008). A Long-Run Equilibrium Demand Function: Tourism in México. *Tourismos: An International Multidisciplinary Journal of Tourism*, *3*(1), 66-82. https://mpra.ub.uni-muechen.de/25375/

Brida, J.G., Sánchez C. J. S. E., Risso, A.W. and Schubert, F. (2008). Tourism Impact in the Long-Run Mexican Economic Growth. *Anatolia: An International Journal of Tourism and Hospitality Research*. The 4th World Conference for Graduate Research in Tourism, Hospitality, and Leisure. pp.265-278

Chica, M., Hernández, J. M., & Bulchand-Gidumal, J. (2021). A collective risk dilemma for tourism restrictions under the COVID-19 context. *Scientific Reports*, *11*(1), 1-12. https://doi.org/10.1038/s41598-021-84604-z.

Clancy, J. M. (1999). Tourism and Development. Evidence from México. *Annals of Tourism Research, 26*(1), 1-20. https://doi.org/10.1016/S0160-7383(98)00046-2.

Clancy, J. M. (2001). *Exporting paradise. Tourism and Development in México*, Pergamon, Amsterdam

Cró, S., & Martins, A. M. (2017). Structural breaks in international tourism demand: Are they caused by crises or disasters?. *Tourism management*, *63*, 3-9. https://doi.org/10.1016/j.tourman.2017.05.009.

Crouch, I.G. (1994). A Meta-Analysis of Tourism Demand. *Annals of Tourism Research,22*(1), 103-118. https://doi.org/10.1016/0160-7383(94)00054-V.

De Kadt, E. (1979). *Tourism. Passport to Development. Perspectives on the social and cultural effects of Tourism in Developing Countries.* Oxford University Press,Washington.

Echtner, C. M. (1995). Entreprenurial Training in Developing Countries. Annals of Tourism Research. 22 (1), 119-134. https://doi.org/10.1016/0160-7383(94)00065-Z

Gray, H. (1966). The Demand for International Travel by the United States and Canada. *International Economic Review*, *7*(1), 83-92. https://doi.org/10.2307/2525372.

Hanafiah, M. H., Jamaluddin, M. R., & Kunjuraman, V. (2021). Qualitative assessment of stakeholders and visitors perceptions towards coastal tourism development at Teluk kemang, port dickson, Malaysia. *Journal of Outdoor Recreation and Tourism*, 35. https://doi.org/10.1016/j.jort.2021.100389

Hale, T., Angrist, N., Goldszmidt, R., Kira, B., Petherick, A., Phillips, T., & Tatlow, H. (2021). A global panel database of pandemic policies (Oxford COVID-19 Government Response Tracker). *Nature Human Behaviour*, *5*(4), 529-538. https://doi.org/10.1038/s41562-021-01079-8

Hall, C.M., & Jenkins, J. (1995). *Tourism and Public Policy*. London: Routledge.

Hall, C. M., Scott, D., & Gössling, S. (2020). Pandemics, transformations and tourism: be careful what you wish for. Tourism Geographies, 22(3), 577-598. https://doi.org/10.1080/14616688.2020.1759131

Harrison, D. (2015). Development theory and tourism in developing countries: what has theory ever done for us?. *International Journal of Asia Pacific Studies*, *11* (S1), 53-82. https://eprints.mdx.ac.uk/id/eprint/22706.

Kim, M. J., Hall, C. M., & Bonn, M. (2021). Can the value-attitude-behavior model and personality predict international tourists' biosecurity practice during the pandemic?. Journal of Hospitality and Tourism Management, 48, 99-109. https://doi.org/10.1016/j.jhtm.2021.05.014.

Laber, G. (1969). Determinants of international travel between Canada and the United States. *Geographical Analysis*, *1*(4), 329-336. https://doi.org/10.1111/j.1538-4632.1969.tb00628.x.

Li, C. C., Mahmood, R., Abdullah, H., & Chuan, O. S. (2013). Economic growth, tourism, and selected macroeconomic variables: A triangular causal relationship in Malaysia. *Margin: The Journal of Applied Economic Research*, *7*(2), 185-206. https://doi.org/10.1177/0973801013483503.

Lim, C. (1997). Review of international tourism demand models. *Annals of tourism research*, *24*(4), 835-849. https://doi.org/10.1016/S0160-7383(97)00049-2.

Lim, C. (1999). A meta-analysis review of international tourism demand. *Journal of Travel Research*, *37*(3), 273-284. https://doi.org/10.1177/004728759903700309

Mantecón, A. (2020) "La crisis sistémica del turismo: una perspectiva global en tiempos de pandemia" pp. 19-30. En Turismo Pos-covid-19. Reflexiones, retos y oportunidades. Simancas, C. M., Hernández, M. & Padrón, F. N. (2020). Cátedra de Turismo, Universidad de la Laguna, España. https://doi.org/10.25145/b.Turismopos-COVID-19.2020

Monterrubio, J. C. & Mendoza-Ontiveros, M. M. (2013) Spring Break travel: Motivations and behaviour in a Mexican destination. *Journal of Tourism Consumption and Practice*, *5*(1), p.18-32. http://hdl.handle.net/10026.1/11710

OECD (2017). Tourism Policy Review of Mexico, OECD Studies on Tourism, OECD Publishing, Paris. https://doi.org/10.1787/9789264266575-en

Olvera, A. (2015). Political Crisis, Social Movements and the Future of Democracy in Mexico. *Revista Mexicana de Ciencias Políticas y Sociales*, *61*(226),279-295. https://doi.org/10.1016/S0185-1918(16)30011-3.

Peng, B., Song, H., Crouch, G. I., & Witt, S. F. (2015). A Meta-Analysis of International Tourism Demand Elasticities. *Journal of Travel Research*, *54*(5), 611-633. https://doi.org/10.1177/0047287514528283

Rasoolimanesh, S. M., Seyfi, S., Rastegar, R., & Hall, C. M. (2021). Destination image during the COVID-19 pandemic and future travel behavior: The moderating role of past experience. *Journal of Destination Marketing & Management*, 21, 100620. https://doi.org/10.1016/j.jdmm.2021.100620.

Rossello, B., & Santana-Gallego, M. (2020). The effects of natural disasters on international tourism: A global analysis. *Tourism Management*, 79,1-11. https://doi.org/10.1016/j.tourman.2020.104080

Santibañez-Aguascalientes, N. A., Borja, Á., & Ardisson, P. L. (2021). Sustainability situations for the southern Gulf of Mexico seafloor, based on environmental,

benthic, and socioeconomic indicators. *Science of The Total Environment*, 787, 147726. https://doi.org/10.1016/j.scitotenv.2021.147726.

Seyfi, S., Hall, C. M., & Shabani, B. (2020). COVID-19 and international travel restrictions: The geopolitics of health and tourism. *Tourism Geographies*, 1-17. https://doi.org/10.1080/14616688.2020.1833972.

Škare, M., Soriano, D. R., & Porada-Rochoń, M. (2021). Impact of COVID-19 on the travel and tourism industry. *Technological Forecasting and Social Change*, *163*, 120469. https://doi.org/10.1016/j.techfore.2020.120469.

Song, H., Dwyer, L., Li, G., & Cao, Z. (2012). Tourism economics research: A review and assessment. *Annals of Tourism Research*, *39*(3), 1653-1682. http://dx.doi.org/10.1016/j.annals.2012.05.023.

Song, H.Y, Qiu, R.T. & Park, J. (2019). `A Review of Research on Tourism Demand Forecasting.´ Annals of Tourism Research, 75, 338-362. https://doi.org/10.1016/j.annals.2018.12.001

Smeral, E. (1988). Tourism Demand, Economic Theory and Econometrics: An integrated Approach. *Journal of Travel Research,* 26(4), 38-43. https://doi.org/10.1177/004728758802600407.

Stronge, W.B. & Redman, M. (1982). U.S. tourism in Mexico: An empirical analysis, Annals of Tourism Research, 9(1), 21-35.

https://doi.org/10.1016/0160-7383(82)90032-9

Thiel, M., de Veer, D., Espinoza-Fuenzalida, N. L., Espinoza, C., Gallardo, C., Hinojosa, I. A., & Villablanca, R. (2021). COVID lessons from the global south–face masks invading tourist beaches and recommendations for the outdoor seasons. *Science of The Total Environment*, 786. https://doi.org/10.1016/j.scitotenv.2021.147486.

UNWTO. World Tourism Organization. (2021). Recuperación turística del caribe mexicano, ejemplo a nivel mundial. Recuperado el 6 de julio de 2020 de: https://www.24-horas.mx/2021/05/21/recuperacion-turistica-del-caribe-mexicano-ejemplo-a-nivel-mundial/

UNWTO. World Tourism Organization. (2020) Impact Assessment of the COVID-19 Outbreak on International Tourism. Recuperado el 6 de julio de 2020 de: https://www.unwto.org/impact-assessment-of-the-covid-19-outbreak-on-international-tourism

Villacé-Molinero, T., Fernández-Muñoz, J. J., Orea-Giner, A., & Fuentes-Moraleda, L. (2021). Understanding the new post-COVID-19 risk scenario: Outlooks and

challenges for a new era of tourism. *Tourism Management*, *86*, 104324. https://doi.org/10.1016/j.tourman.2021.104324.

WEF. World Economic Forum (2019). The Travel & Tourism Competitiveness Report 2019: Travel and Tourism at a Tipping Point. Recuperado el 6 de julio de 2020 de: http://www3.weforum.org/docs/WEF_TTCR_2019.pdf

Yang, Y., Liu, H., & Li, X. (Robert). (2019). The World Is Flatter? Examining the Relationship between Cultural Distance and International Tourist Flows. *Journal of Travel Research*, *58*(2), 224–240. https://doi.org/10.1177/0047287517748780

Zhang, J., & Jensen, C. (2007). Comparative Advantage. Explaining Tourism Flows. *Annals of Tourism Research, 34*(1), 223-243. https://doi.org/10.1016/j.annals.2006.08.004.

CHAPTER FOUR

MSMEs in The Face of Economic Reconstruction: Learning Curves and Changes in The Business Structure

Moisés Alejandro Alarcón Osuna
Carlos Fong Reynoso
Luis Ernesto Ocampo Figueroa

Introduction

In the spring of 2020, an unprecedented crisis exploded in recent economic history, caused by various factors of an economic, financial, technological, environmental, health and political nature. The outbreak of the crisis was driven by the emergence of the COVID-19 pandemic[1], which led to "the great blockade" (Kuckertz et al 2020), enhanced by the various confinements and restrictions on economic activity around the world, through which have tried to contain the pandemic. In the case of Mexico, according to the World Bank (2021), the drop in GDP associated with this has been (-8.3%)

---

[1] For a more in-depth analysis of the COVID-19 crisis, the review by Fong (2020) is suggested. What the SARS-COV-2 took away: New paradigms in the analysis of MSMEs in Fong, Ocampo and Alarcón (2020) MSME's strategic response to the covid-19 crisis: a modular case study. Recovered from http://cucea.udg.mx/include/publicaciones/coorinv/pdf/RespuestaestrategicamypimesEBOOK.pdf

in 2020, although the economy was already in recession since 2019, with a fall of (- 0.2%).

In this context, proposing strategies for the reconstruction of the economy is an urgent task that involves several challenges. The multi-causality at the origin of the crisis makes it difficult to have a unified diagnosis that allows an orderly exit. Although various indicators indicate that the economy has started to recover, various risks and tensions persist that compromise this possible recovery. In this regard, the World Bank in its June 2021 publication "Global Economic Prospects" points out the following:

"The world economy is experiencing an exceptionally strong but very uneven recovery. Global growth is projected to reach 5.6 percent in 2021, its fastest post-recession pace in 80 years, supported in part by consistent but highly uneven access to vaccines. Growth is concentrated in a few major economies, with most emerging market and developing economies (EMDE) lagging behind: while around 90 percent of advanced economies are expected to regain their former per capita income levels of the pandemic by 2022, only about a third of EMDEs will succeed ... The global outlook remains highly uncertain, with significant risks surrounding the trajectory of the pandemic and the possibility of financial stress amid heavy debt burdens. Controlling the pandemic globally will require a more equitable distribution of vaccines, especially for low-income countries. In addition to the efforts required to achieve widespread vaccination, policymakers face a difficult balancing act in trying to nurture recovery through efficiently allocated fiscal support while safeguarding the stability of prices and fiscal sustainability. Policymakers can also help secure a lasting recovery through reforms that enhance growth and steer their economies on a green, resilient and inclusive development path. Among the policies needed are efforts to reduce trade costs so that trade can once again become a robust engine of growth." (The World Bank 2021 P.XVII)

The strategies to be developed for economic recovery should be flexible and capable of adjusting to unobserved scenarios in previous crises. The unprecedented nature of this particular crisis is evident in the fact that its evolution at different times has occurred outside the foreseeable channels based on previous experiences and that there is the possibility that this situation will also occur in the future. Velasco (2021) points out

that in the early phases the negative effects of the crisis were expected to be greater in low- or middle-income countries than in high-income countries, but this did not happen, and the pandemic had a devastating effect on Developed economies, which according to World Bank data (World Bank 2021) had a drop of (-4.7) in GDP in 2020, while the drop in emerging economies was (-1.7). There is no clear explanation why the pandemic has been more severe and caused more deaths in countries with stronger health systems and greater economic capacity. Possibly this is due to the quality of the records, but in any case, as Velasco points out, thanks to the fact that low world interest rates allowed emerging economies to carry out efficient countercyclical policies, even when they were of a much smaller dimension than those promoted in rich countries have been able to overcome part of the economic effects of the pandemic.

However, countercyclical policies are not a cost-free solution. As Roubini (2021a, 2021b) points out, the high public deficits generated by its financing also introduce distortions in the behavior of economies, generate growing inequality and increase the risk of the outbreak of a new stagflationary debt crisis.

For these reasons, designing strategies for exiting the crisis and subsequent economic reconstruction is complex for all public administrations because, in fact, the elements that led to its outbreak continue to be present: the pandemic has not ended and the fifth wave contagion questions the efficiency of vaccines, the ecological crisis is increasingly evident, technological innovation widens the gap between countries, regions and companies that have been able to take advantage of it and those that have lagged behind. But in addition, global logistics and value chains have been affected and many companies in various sectors experience difficulties in accessing necessary supplies or suffer considerable increases in their costs.

One of the sectors most affected by the crisis has been Micro, Small and Medium Enterprises (MSME). Paradoxically, the behavior of this sector is key in the reconstruction of the economy (OECD 2021) due to its impact on employment, but also because the companies in this group constitute one of the main mechanisms for incorporating technological innovation into the economy, and also to test new organizational solutions

to the challenges caused by the pandemic. This observation has been shared by various researchers over the years (Storey 1994, Burns 2006, Julien 2000, Fong 2020, etc).

From a national perspective, the reduction of restrictions on economic activity has led to a rapid recovery of Mexico's GDP, which according to World Bank estimates, will experience GDP growth of 5% in 2021 and 3% in 2022, (World Bank 2021). The growth of the economy is necessary to boost the performance of MSMEs and the creation of companies, but not enough for the recovery of the sector as a whole. In this context, the objective of this work is to analyze the sectoral behavior of MSMEs during the COVID-19 pandemic, in order to establish its impact on possible economic recovery scenarios. With this intention, the learning curves of the different strata of the company were calculated, as well as the changes in the business structure, to identify the behavior of the sector.

The structure of this work is as follows, in addition to this introduction, a brief review of the literature is presented, where some theories about the importance of MSMEs in economic reactivation are detailed. Next, there is a section with the methodology used in this research, which covers the learning curves, as well as some estimation questions. At the end, the results and their discussion are presented, as well as the conclusions of the research.

Literature Review

To analyze the future behavior of MSMEs in the face of economic recovery, and whether it will act as a brake or accelerator for it, the incentives that affect their behavior must be taken into account. This could provide criteria for decision makers to design appropriate incentive systems. It is also necessary to take into account the possible responses that the company has to these incentives, and if this response is homogeneous or there are different types of companies with differentiated responses. If this is the case, the need for specific policies for each subset is evident, in order to generate the incentives that promote the desired behavior.

In addition, the behavior already observed during the crisis must be taken into account, since companies experience restrictions in their ability to adapt to abrupt changes in their strategic path. What a firm can or cannot do, in a specific situation, depends on the resources and capacities at its disposal, in particular those of a specific, specialized and co-specialized nature, which are obtained and accumulated in the company throughout its history. And whose idiosyncratic character originates from the path of strategic decisions followed over time (Dierickx and Cool 1993, Teece Pisano and Shuen 1997, Fong 2017a, 2017b). In these terms, a firm dedicated to clothing can hardly change in the short term to dedicate itself to the manufacture of hydroalcoholic gel to respond to the opportunities generated by the crisis, but instead it could manufacture face masks.

The creation of companies and the performance of MSMEs[2] respond to multiple incentives, among which are market opportunities, access to financing, various attributes associated with the entrepreneur, such as their level of aversion to risk, their propensity to innovate, undertake, their schooling, whether they come from an urban or rural environment, their social networks and ties, etc. Institutions also play an important role, both those of a regulatory nature, which generate legal security, and those that generate knowledge and technological innovation. Not all incentives are economic in nature and cannot be modified in the short term. For this reason, in this work, rather than addressing its individual analysis, it has been considered convenient to look for which incentives have had a greater impact regulating the behavior of MSMEs. This, however, raises questions about whether all companies respond homogeneously.

Various analyzes have shown that MSMEs do not respond homogeneously to similar incentives. This is due to the fact that each of the economic units that are part of the sector is unique and specific (Wernerfelt 1984, Barney 1991, Dierikx and Cool 1993, etc.), even though the companies that are dedicated to the same activity may be very similar. Each other (Eisenhardt and Martin 2000). The assumption of differentiated companies that participate in monopolistic markets, comes from far in economic thought (Chamberlin 1933). However, the dominant theoretical

---

2   Assuming that newly created companies are usually part of the entire MSME.

perspective is that differentiating companies by size does not make sense, while the different economic units will grow until reaching the optimal scale where its total average costs are minimized and it is fulfilled that average and marginal costs are equalized. Assuming perfect competition, all companies in a specific market are equal to each other and respond symmetrically to incentives.

However, in the real world, perfect competition is an entelechy, companies are differentiated by multiple factors and their response to incentives is affected by variables of various orders. This leads to the analysis of business behavior and performance having to be carried out from subsets with more homogeneous characteristics. The most used criterion to separate companies into strata with similar characteristics is the number of employees. This perspective facilitates econometric analysis by allowing the differentiation between strata with numerical criteria, and not with casuistic attributes such as maturity, consolidation, etc. However, as Fong (2020) discusses, as a result of scientific and technological progress, the number of employees seems to no longer be the most relevant characteristic to separate large companies from those of the MSMEs as a whole and their capacities and intensity in the use of innovative technologies seems to be more relevant in their behavior and performance.

Table 1 shows for the Mexican case the existence of companies whose behavior, manifested in sales, differs significantly from the stratum to which it corresponds. Thus, it is observed that there are micro-companies with sales of a large company and large companies with their own sales of micro-companies.

Table 1. Stratification of companies in Mexico according to criteria of number of employees or amount of sales, with data from the 2019 census.

MSMES in The Face of Economic Reconstruction: Learning
Curves and Changes In The Business Structure

Coincidencia		
Sobrestimación de tamaño por empleados		
Subestimación de tamaño por empleados		

Nacional

		Tamaño por Empleados					
	Estratos	micro	pequeña	mediana	grande	confidencialidad	Total general
Tamaño por Ventas	micro	4,524,441	25,285	8			4,549,734
	pequeña	41,821	156,605	18,148	14,213		230,787
	mediana	15	598	4,990	3,368		8,971
	grande	250	108	1,898	7,604		9,860
	confidencialidad					805	805
	Total general	4,566,527	182,596	25,044	25,185	805	4800157

Coincidencia		
Sobrestimación de tamaño por empleados		
Subestimación de tamaño por empleados		

Jalisco

		Tamaño por Numero de Empleados					
	Estrato	micro	pequeña	mediana	grande	Confidencial	Total general
Tamaño por Ventas	micro	305,573	1,922	6	3		307,504
	pequeña	4,203	17,033	1,669	1,173		24,078
	mediana	0	99	338	169		606
	grande	11	0	176	353		540
	Confidencial					2,392	2,392
	Total general	309,787	19,054	2,189	1,698	2,392	335120

Source: Prepared by Dr. Moises Alejandro Alarcón Osuna, in Fong (2020) What the SARS-COV-2 took away: New paradigms in the analysis of MSMEs in Fong, Ocampo and Alarcón (2020) Strategic response of MSMEs Faced with the covid-19 crisis: a modular case study Retrieved from http://cucea.udg.mx/include/publicaciones/coorin/pdf/RespuestaestrategicamypimesEBOOK.pdf

The anomaly identified shows that in addition to size, there are other variables that affect the approach of companies and allow the identification of subsets with common characteristics whose response to incentives may be more homogeneous.

What is the strategic response of the company to the incentives that were generated in the crisis? Various authors such as Anand et al (2020), Eggers (2020), Kottika (2020), Kuckertz et al (2020), Papadopoulos, Baltas, and Balta, (2020) and Wenzel, Stanske, and Lieberman (2020) have analyzed which it has been the strategic response of the MSMEs to crises. Wenzel, Stanske, and Lieberman (2020) analyze the articles on this topic published in the journals of the Strategic Management Society (SMS), considering a crisis as the changes that the members of the company perceive as sudden, unexpected and massively disruptive. They conclude that there are four strategies to respond to the crisis: reduction, perseverance, innovation and exit. Each of these strategies is a valid response option for the company, but it is evident that for the recovery of the economy a behavior of perseverance or innovation is more convenient than one of reduction and exit.

If there are different types of strategic response by companies to a crisis, and the incentives affect different subsets of companies in a different way, then it would be advisable to address which incentives can lead a particular typology of companies to a specific strategy. The empirical evidence collected during the crisis seems to support this possibility. *The International Trade Center* (ITC), points out in the "*SME Competitiveness Outlook 2020: COVID-19: The Great Lockdown and its Impact on Small Business*", that there are certain variables that affect the performance of the MSME and the way in which the crisis. Among them are: the technological level and the level of accumulated capacities in the company associated with age, its exposure to international competition, its financial capacity and its agility associated with its ability to innovate by obtaining external knowledge. These variables, in addition to being relevant in survival to the crisis, could be the key in adapting to the post-pandemic scenario, and a better understanding of their mechanisms of action is relevant to improve actions aimed at boosting the performance of MSMEs. The ITC analysis does not include the number of employees as a relevant

variable, so it can be considered that the search for economies of scale has not been relevant in the company's strategy in the face of the crisis.

The ITC points out 3 crisis response strategies: withdrawal, resilience and agility that show similarity with the categories theoretically identified by Wenzel, Stanske, and Lieberman (2020). The withdrawal strategy is equivalent to the exit strategies, that of resilience to that of persistence in the business model and that of agility to that of innovation, since both involve transformation processes of the company. The ITC does not include the reduction category explicitly, but integrates it as part of the resilience strategy, associated with the first phase of the crisis.

The evidence provided by the ITC shows that the response of MSMEs to the incentives generated by the public administrations during the crisis has not been homogeneous, but that certain stimuli are essential for the performance of the sector.

Other studies have also contributed to identifying elements that can help the MSME become an engine that drives economic reconstruction after the crisis. Fong, Ocampo and Alarcón (2020) establish a causal relationship between the resources and capacities of the company and its strategic response to the crisis. In their analysis, they use the categories proposed by Wenzel, Stanske, and Lieberman (2020) and empirically demonstrate that the strategic behavior of the company during the crisis is explained by the level of skills accumulated in the company and by its intensity in the use of technology. . In this work, by conducting a modular case study carried out in 15 companies of the MSMEs as a whole, they establish that the innovation strategies respond to one. Greater availability of capacities and technological intensity, while low levels of capacities and use of technology lead to strategies for closing or reducing activity. One of the implications of this work is that if the public administrations responsible for promoting the recovery of the economy after the crisis seek for the MSME to be a dynamic, innovative and resilient sector, they must generate incentive systems that promote the transfer of technology and innovation from knowledge generating centers for companies and not limited to promoting financial liquidity.

The empirical evidence indicated above is relevant to understanding the relationship between incentives and the strategic response of MSMEs

to the crisis, but there is still a lack of evidence that allows linking the different subsets of MSMEs and the strategies adopted in the face of the crisis in order to establish the focus and scope that the different policies to boost the performance of these companies should have in order to face the way out of the crisis. With the intention of evaluating the general situation of the MSMEs in Jalisco, and moving in this direction, the learning curves of the different strata of the company were calculated, as well as the changes in the business structure, in order to establish the base scenario for an adequate design of policies to promote the performance of the MSME.

Methodology

Learning curves and changes in the business structure

A learning curve shows a relationship between the passage of time and the progress of some phenomenon. In this case, the evolution of time is presented as companies produce more. The logic behind these learning curves is that the more production is generated over time, the less time companies will require to generate an amount x of product.

Perhaps one of the first documents in which learning curves (LC) are estimated was that of Andress (1954), in which it is an improvement in terms of the reduction of the time dedicated to work to elaborate x units, taking note that production is increasing.

All this theory was pointed out by Smith (1776) in the Wealth of Nations, where as a person specializes in his work, this increases his efficiency. In this way, Andress's (1954) model is specified as:

$$Q = KX^n$$

Where:
Q: It is the average of hours of work per man, to produce x number of units.

K: It is a parameter that indicates the number of man hours required for the first unit.

n: It is the rate at which Q decreases as X increases.

X: It is the accumulated level of production.

The learning curves have varied somewhat from the model presented above, since some LCs are based on cost reduction, while others are based on the introduction of innovations. Cost reduction according to Abernathy and Wayne (1974) is based on promoting changes that increase the standardization of a product, vertical integrations, the division of labor, economies of scale and the generation of production lines.

Finally, Olivas (2008) argues that the LC proposal can be divided into two scenarios:

- The experience curve of a new entrant where your company is supported by technology with a different experience curve than competitors.

- The experience curve of a new entrant with "smart tracking" and technology transfer.

From the foregoing, some strategic management implications emerge since, if a new participant is supported by different technology than the competitors, then the positioning of this new participant depends on their own actions and not on the competitors. On the other hand, if a new participant is not supported by technologies then their positioning will depend on their ability to learn quickly.

For this study, taking LCs into account is essential to understand the new configuration of the post-Covid-19 business structure, since some companies closed operations, others remained in the market and another group of companies entered the market. Which implies loss of business learning in the first case, maintenance of technologies in the second and introduction of new technologies in the third case. All this generates learning gains or losses and therefore productivity gains or losses, as the case may be.

Method

The LC contrasting method is through an estimation of a regression analysis, where the Andress (1954) model is retaken, but it is estimated using natural logarithms of production and hours worked, this with the intention of linearizing the coefficients.

Additionally, dichotomous variables are retaken to estimate changes in the ACs, depending on whether the company is high-tech or low-tech. In this way the three models to be estimated are:

$$Ln(Q_i) = B_0 + B_1 Ln(X_i) + e_i \qquad (1)$$

$$Ln(Q_i) = B_0 + D + \sum B_i Ln(X_i) + e_i \qquad (2)$$

$$Ln(Q_i) = B_0 + \sum B_i Ln(X_i) + D \sum B_i Ln(X_i) + e_i \qquad (3)$$

Where D is a dichotomous variable that represents high technology companies, the variable takes values of 1 if it is technological and 0 otherwise. Bi represents the coefficients of the four types of company (micro, small, medium and large). This dichotomous variable is constructed from categories of the North American Industrial Classification System (NAICS), the methodology is the same as that used in Alarcón (2018).

After having the estimates, an estimate is made for each type of company (micro, small, medium and large), to know how many hours of work it would take for each of them to generate 1000 units of x product.

The last step consists of taking into account the changes in the business structure of Jalisco, to have an idea of what were the losses and / or learning gains after one year of the economic impacts of Covid-19.

Data

The data used for the regression analysis comes from the 2019 Economic Censuses published by INEGI, where data on production and hours worked by each stratum of company (by number of employees) were downloaded. It should be noted that, data are used for the state of

Jalisco, and that the total economic activities are not taken into account, because for confidentiality reasons some activities are grouped into only one category of companies. For this reason, only the sectors that had all the complete breakdowns were taken into account.

The data used to contrast the change in the business structure come from INEGI's National Directory of Economic Units (DENUE in spanish). It should be noted that only two points in time were taken into account, the Jalisco directory published in April 2020 and the one published in May 2021, since with these data we have an idea of what was the evolution of the business structure during the Covid-19 pandemic.

Finally, a cross was made between the LC regression model and the change in the business structure to estimate the effects on gains and/or learning losses derived from COVID-19, as well as its implications for the economic recovery of Jalisco.

4 RESULTS

The results of the econometric model to estimate LC show that there is both a change in the intercept for technology companies and a change in the slope for technology companies (except for large ones), as shown in Table 2.

Table 2
Results of the regression model, working hours as a dependent variable

Variables	Coefficients	t	Coefficients	t	Coefficients	t
Intercept	3.238	14.763***	3.301	15.785***		
Micro	0.795	20.680***	0.800	21.845***	3.246	15.280***
Small	0.746	20.762***	0.753	21.990***	0.809	21.903***
Medium	0.717	22.406***	0.725	23.775***	0.764	21.557***
Large	0.750	25.401***	0.757	26.909***	0.735	23.109***
D			-0.615	-5.147***	0.755	25.252***

Variables	Coefficients	t	Coefficients	t	Coefficients	t
D*Micro					-0.113	-2.685**
D*Small					-0.106	-3.106***
D*Medium					-0.093	-3.086***
D*Large					-0.028	-0.85
R^2	0.73		0.76		0.76	
Typical error	0.75		0.71		0.71	
F	165.681***		151.632***		94.110***	
OBS	250		250		250	

Source: Own elaboration. *** Significance at 0.01; ** Significance at 0.05. The Micro, Small, Medium and Large variables show production by company size.

From the above, a specific scenario can be built where companies can produce 1000 units of x product, where the differences in hours required by each type of company to be able to generate that level of production are observed. These results are shown in Table 3.

Table 3
Hours of labor required for the production of 1000 units of x products

Firm Type	Hours	Hours	Hours
Micro	788	254	866
Small	561	184	634
Medium	459	153	522
Large	576	190	598
Micro Tech		254	396
Small Tech		184	306
Medium Tech		153	274
Large Tech		189	493

Source: Own elaboration with results of the econometric model.

With this, it is clear that technology-type companies have a propensity to learn more quickly than other companies. On the other hand, technology companies also learn and/or are more efficient than other companies for micro, small and medium sizes are. Where it is interesting that technology-type companies and that are additionally large, do not have significant learning curves with respect to their large-size peers.

Regarding the changes in the business structure, the relevant result is that in the DENUE there were around 376,062 companies in Jalisco in April 2020, while for May 2021 there are 377,777 companies, this is a growth of 1,715 companies or the equivalent to 0.5% more companies from April to May. These results are best seen in Table 4.

Table 4
Percentage change in the business fabric
between April 2020 and May 2021

Firm Size	No Tech	Tech	Total
0 a 5 employees	0.7	2.3	0.7
6 a 10 employees	-1.5	-1.6	-1.5
11 a 30 employees	-0.3	-0.6	-0.3
31 a 50 employees	2.4	8.0	2.8
51 a 100 employees	0.1	-9.0	-0.8
101 a 250 p employees	2.0	-10.3	0.4
251 or more employees	-16.1	28.9	-10.4
Total	0.4	1.6	0.5

Source: Own elaboration with data from DENUE-INEGI.

According to these results, it is clear that there is a disintegration of the micro-sized company in Jalisco, with a total growth of 0.7%, driven mainly by traditional companies. Meanwhile, there is a growth of companies in strata of 31 to 50 employees, that is, a growth of medium-sized companies. It should be noted that large-sized companies decreased in number, but with an exception in technology-type companies, since these grew by 28.9%.

These changes generate interesting results, since the number of microenterprises increased, although these are the ones with the shortest learning curve, except for those of a technological nature. While the

growth of medium-sized companies, if it represents a gain in productivity due to the gain in learning curves. Finally, large companies decrease while large technology companies grow, which does not increase productivity, since these learning coefficients were not significant.

Discussion and Conclusions

The results found allow us to establish that the business structure, although it is true that it decreased for large companies (251 or more employees), medium (51 to 100 employees) and small (6 to 30 employees), it is also true that the micro-level company size (0 to 5 employees). This shows that in principle there has been a self-employment strategy due to the loss of jobs due to the COVID-19 crisis.

However, to the above, it should be noted that there are some points that must be taken into account, since, at the level of technological and non-technological firms, it can be observed that technological micro-companies grew at a higher percentage than non-technological companies. technological, although in volume the non-technological companies are more. It should also be noted that large and technological companies grew, when a decreasing trend was observed in the closure of large non-technological companies.

These results show that the companies of the MSME as a whole that are located in technological sectors perform better than those in non-technological sectors, regardless of the number of employees. In fact, the data show that economies of scale are irrelevant for this business group and that fostering economies of focus, with an emphasis on a more intensive use of technology, may be relevant for economic recovery.

That said, it is worth noting that learning curves have been lost for small-sized companies, which are not offset by the level of learning for non-technological micro-companies. This shows that the economic recovery process may be slower than expected for two reasons, firstly because not all unemployed people have the necessary skills to become entrepreneurs, which can affect the profile of creating micro-sized companies.

Second, because the loss of learning occurs in the loss of a large company, which has relatively higher learning curves than that of MSMEs.

References

Alarcón, Moisés (2018). "Encadenamientos productivos y jerarquías de sectores de base tecnológica en México". Econoquantum, Vol. 15 (2), pp. 73-94.

Anand, P.; Ferrer, B.; Gao, Q.; Nogales, R. & E. Unterhalter (2020), "COVID-19 As a Capability Crisis: Using the Capability Framework to Understand Policy Challenges", Journal of Human Development and Capabilities, 21(3), pp. 293-299.

Andress, Frank (1954). "The Learning Curve as a Production Tool". Harvard Business Review, Vol 32(1), Enero / Febrero, pp. 87-97.

Abernathy, William y Wayne, Kenneth (1974). "Limits of the Learning Curve". Harvard Business Review, 52:5, Septiembre / Octubre, pp. 109-119.

Barney, J. B. (1991). Firm Resources and Sustained Competitive Advantage. Journal of Management, 17(1), 99-120.

Burns, Paul. (1996). Introduction: the significance of small firms, en Small business and entrepreneurship, Macmillan Business

Chamberlin, E. H. (1933). Monopolistic Competition the Meaning of Differentiation. En BARNEY, J.B. y W.G. OUCHI (1986): Organizational Economics: Toward a New Paradigm for Understanding and Studying Organizations. San Francisco: Jossey-Bass.

Dierickx, I. & Cool, K. (1989). "Asset stock accumulation and sustainability of competitive advantage". Managemet Science, Vol. 35 (12), pp. 1504-1511.

Eggers, F. (2020). Masters of disasters? challenges and opportunities for SMEs in times of crisis. Journal of Business Research, 116, 199-208.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: What are they? Strategic Management Journal, 21(10-11), 1105-1121.

Fong, C. (2017). Las teorías de la ventaja competitiva en Fong, C (2017) *Competitividad e Internacionalización de la PYME en México: Análisis Sectorial y Empresarial. Pp.29-78* Universidad de Guadalajara. Recuperado de http://www.cucea.udg.mx/administra/publicaciones/portadas/pdf/Competitividad-e-internacionalizacion-EBOOK.pdf

Fong-Reynoso, C., Flores-Valenzuela, K. E, & Cardoza-Campos, L. M. (2017). La teoría de recursos y capacidades: un análisis bibliométrico. Nova Scientia, 9(19), 411-440. https://doi.org/10.21640/ns.v9i19.739

Fong (2020) Lo que el SARS-COV-2 se llevó: Nuevos paradigmas en el análisis de la MiPyME en Fong, Ocampo y Alarcón (2020) *Respuesta estratégica de la mipyme ante la crisis de la COVID-19: un estudio de casos modular* recuperado de http://cucea.udg.mx/include/publicaciones/coorinv/pdf/Respuestaestrategicamypimes EBOOK.pdf

International Trade Centre (2020). SME Competitiveness Outlook 2020: COVID-19: The Great Lockdown and its Impact on Small Business. ITC, Geneva. Recuperado de https://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/ITCSMECO2020.pdf

Julien, P. A. (ed.) (2000) The State of the Art in Small Business and Entrepreneurship, 2nd ed. Brockfield, VT: Ashgate.

Kottika, E., Özsomer, A., Rydén, P., Theodorakis, I. G., Kaminakis, K., Kottikas, K. G., & Stathakopoulos, V. (2020). We survived this! what managers could learn from SMEs who successfully navigated the greek economic crisis. Industrial Marketing Management, 88, 352-365.

Kuckertz, A., Brändle, L., Gaudig, A., Hinderer, S., Reyes, C. A. M., Prochotta, A., Berger, E. S. (2020). Startups in times of crisis–A rapid response to the COVID-19 pandemic. Journal of Business Venturing Insights, 13 e 00169.

Organización para la Cooperación y el Desarrollo Económicos (OCDE) (2021) OECD SME and Entrepreneurship Outlook 2021 https://doi.org/10.1787/97a5bbfe-en

Olivas, Cesar (2008). "Comparación de las curvas de aprendizaje de la IME para municipios fronterizos y no fronterizos: un análisis dinámico". Cuaderno de Trabajo UACJ, Núm. 202.

Papadopoulos, T., Baltas, K. N., & Balta, M. E. (2020). The use of digital technologies by small and medium enterprises during COVID-19: Implications for theory and practice. International Journal of Information Management, 102-192.

Roubini, N (7 de marzo de 2021) La burbuja del Covid, Project Syndicate. Recuperado de https://www.project-syndicate.org/commentary/us-economy-faces-risks-of-bubble-medium-term-stagflation-by-nouriel-roubini-2021-03/spanish

Roubini, N (30 de junio de 2021) La inminente crisis de deuda estanflacionaria Project Syndicate. Recuperado de https://www.project-syndicate.org/commentary/stagflation-debt-crisis-2020s-by-nouriel-roubini-2021-06/spanish

Smith, Adam (1776). "El Origen de la Riqueza de las Naciones". Alianza Editorial.

Storey, D. J. (1994) *Understanding the small business sector*, London England Routledge 11 New Fetter Lane,

Teece, D.; Pisano, G. & Shuen, A. (1997). "Dynamic Capabilities and Strategic Management". Strategic Management Journal, Vol. 18 (7), pp. 509-533.

Velasco, A.(3 de febrero de 2021) El tsunamo del Covid y los Mercados Emergentes, Project Syndicate. Recuperado de https://www.project-syndicate.org/commentary/why-covid-tsunami-has-spared-emerging-and-developing-countries-by-andres-velasco-2021-02/spanish

Wernerfelt, B. (1984). A Resource-based View of the Firm. Strategic Management Journal, 5, 171-180.

Wenzel, M., Stanske, S., & Lieberman, M. B. (2020) Strategic responses to crisis. Strategic Management Journal, doi: 10.1002/smj.3161

World Bank (2021) "Global Economic Prospects" DOI: 10.1596/978-1-4648-1665-9

CHAPTER FIVE

Financial Inclusion of Mexican Households in The Informal Financial System

Damara Semirais Álvarez González
Antonio Ruíz Porras

Introduction

Traditionally, Mexican authorities define financial inclusion in terms of the access and use of regulated financial services (CONAIF, 2016). This definition is particularly useful to provide guarantees regarding consumers´ protection, the promotion of financial education and the acquisition of the financial capabilities. In this context, savings and credit services are the most important ones available to Mexican households.

Mohseni (2017) emphasizes that savings and credit products allow households to: 1) facilitate transactions; 2) manage adequately their resources; 3) improve their quality of life, 4) protect them against vulnerability; 5) achieve investment opportunities; 6) use durable and non-durable goods; and, 7) sustain their economic independence.

Poor people usually do not have formal jobs nor labor benefits. Such situation forces them to live in the informal economy. However, this situation does not imply that poor people do not use nor have access to

savings and credit. In many countries, in parallel with the formal financial system, exist an informal one. The informal financial system allows poor people to finance their livelihoods, to accumulate assets, to manage risks and to consume goods and services (Cull et. al., (2014). In this context, the informal financial system and the products traded there may not be problems. Indeed, they may be instruments to promote financial inclusion and economic development. However, there is little knowledge about this informal financial system and their related informal financial products. Less is known about the determinants of savings, credits and financial inclusion in the informal financial systems.

Here, we study the financial inclusion determinants of Mexican households using supply-side, demand-side and socioeconomic determinants of the access and use of savings and credit products. We focus on the main products available in the informal financial system. We use micro data from surveys for the years 2012, 2015 and 2018. Particularly, we focus on the access and use of savings and credit products under the assumption that these products can increase households' welfare and their economic development

We justify this study under the consideration that more than 50% of the Mexican population live under poverty and informality conditions. The possible implication is that the segment under poverty and informality conditions can be susceptible to use savings and credit mechanisms of the informal financial system.

We study the supply-side, demand-side and socioeconomic determinants of access and use of savings and credit products by Mexican households in the informal financial system. We use micro data from the National Financial Inclusion Survey (acronym ENIF) for the years 2012, 2015 and 2018 to build two individual indicators, for savings and credit, and an aggregate one. The analysis relies on estimations of the logit and the generalize linear models.

We use the following research questions for the purpose of guiding the study: 1) Does financial inclusion among workers depend on whether exist benefits?; 2) Does financial inclusion depend on gender?; 3) Does financial inclusion among workers depend on their level of education

and experience?; and, 4) Which implications may be derived from the previous answers?

We develop this study using the following hypotheses:

H1: Households with workers with and without labor benefits use and have access to informal financial products.

H2: Financial inclusion is similar among men and women.

H3: Savings, credit and financial inclusion depend mainly on households´ demand-side determinants.

The chapter is organized in five sections. Particularly, the second section shows the literature review. The third section describes the econometric methodology. The fourth section shows the econometric results. The last section concludes..

Literature Review

Financial inclusion has been studied in terms of the systemic and the non-systemic approaches. The systemic approach emphasizes the study of the supply and demand determinants of financial inclusion. Thus this approach emphasizes a market perspective regarding financial inclusion. The non-systemic or segmentation approach analyzes financial inclusion from the social, institutional or technological perspectives.

a) The systemic approach

Studies that focus on the supply side determinants of financial inclusion usually analyze variables regarding geographical access, pricing, penetration and the use of financial products and services. Particularly, Villacorta and Reyes (2012), study the level of financial inclusion in Mexico. Furthermore, they compare this level with the ones of Latin American and the Caribbean countries. They conclude that Mexico is lagged in terms of financial inclusion. They explain this situation in terms of the existence of monopolistic practices by the formal financial institutions and

the existence of market restrictions for the micro financial and informal financial institutions.

Pavón (2016) analyzes financial inclusion for small firms of Ecuador and Mexico. He finds that certain channels and instruments promote the access to the financial markets. Pavón concludes that: a) The informal financial system has a big share of the credit activity of both countries; b) credit cards are frequently common, but other instruments, like mobile banking, are not; c) small firms do not use frequently nor intensively financial products; and d) financial inclusion strategies should prioritize the protection of the users of financial services.

Studies that focus on the demand side determinants of financial inclusion usually analyze variables regarding the types and characteristics of the users of financial services. Particularly, Martínez-Carrasco et. al., (2016) assess the level of financial inclusion in rural areas. Their findings show that people with low levels of income and high levels of marginalization can save outside the formal financial system. Moreover, their findings suggest that financial culture may be useful to encourage the financial inclusion among poor people.

Cámara and Tuesta (2015), analyze the determinants of financial inclusion in Peruvian households and firms. They find that marginalized households usually use the informal financial system. They also find that firms usually use more the formal financial system. They also find that loans and mortgages are important financial inclusion's determinants for households; and that. formality and education are important determinants for firms.

Mansell (1995) analyzes the informal financial system in Mexico. Mansell shows that poor people have the capacity to save and a savings culture. She also finds that poor people need more savings products than credit ones. She concludes that financial services need to increase their quality in order to encourage economic development. Indeed, she argues that the income of low-income households and the standards of living among poor people may improve with financial inclusion.

b) The non-systemic or segmentation approach

Morduch and Armendariz (2005) analyze some microfinancial institutions in order to the improve the financial contracts available to poor people. Their findings show that poor households have access to financial intermediation even when they do not have collateral guarantees. Moreover, they describe the microfinance mechanisms and the instruments available that allow poor people to have access to intermediation activities. Such mechanisms and instruments include loans (provided by family, relatives and friends); ROSCAS (rotating savings and credit associations), credit cooperatives and moneylenders.

Traditionally, the microfinance literature emphasizes that microcredit encourages economic development in poor countries. However, some studies do not support this belief. Among these studies are the ones of Banerjee et al. (2015). Indeed, they do not find any international evidence regarding the usefulness of microcredit regarding changes in the levels of poverty, health, education nor women's empowerment.

The literature review highlights the need of further studies to understand the determinants of savings, credit and financial inclusion. Here we analyze these determinants using supply-side, demand-side and socio-economic data from Mexican households. Particularly, we focus on the products available in the Mexican informal financial system to update and complement the studies of Mansell (1995), Morduch and Armendariz (2005) and Banerjee et al. (2015). Moreover, our study allows us to complement the studies of Villacorta and Reyes (2012) and Pavón (2016) regarding the formal Mexican financial system. In this context, the main contribution of this study relies on the provision of evidence regarding the functioning of the informal financial system. We emphasize this contribution because it may be relevant for academics and policy-makers alike.

Methodology

Here we describe the methodology used to develop this investigation. Particularly, we focus on the microdata and on the main econometric tech-

niques used. For simplicity, we divide this section in three subsections. The first subsection focuses on the features of the database analyzed. The second one focuses on the logit regressions used to study the effects of the supply-side, demand-side and socioeconomic determinants on the access and use of savings and credit products. The third one focuses on the GLM regressions used to study the determinants of the savings, credit and financial inclusion.

We should emphasize that we analyze the determinants of savings, credit and financial inclusion using data of the Mexican households. Particularly, we divide them into households with workers with and without labor benefits. We justify such classification under the consideration that the households that depend on workers without benefits are more than half of all the Mexican households. Such classification allows us to consider the similarities and differences regarding savings, credit and financial inclusion between both types of households. Moreover, it allows us to assess the effects of the supply-side, demand-side and socioeconomic determinants between both types of households.

a) The database

Data are obtained from the National Financial Inclusion Surveys (ENIF) of the years 2012, 2015 and 2018 published by the National Institute of Statistics and Geography (known by the acronym INEGI). We build the analyzed sample with the answers to eleven specific binary questions provided by the households. The questions are binary because the answers can only be "Yes" or "No".

We build three indexes with the answers given by the households to the binary questions. The first index, the savings index, focuses on the access and use of informal savings products (five questions). The second one, the credit index, focuses on the access and use of informal credit products (six questions). The third one, the financial inclusion index, focuses on the access and use of both types of informal products (eleven questions). We use these indexes to measure the savings and credit activities prevailing in the informal financial system. But also to measure the degree of financial inclusion among Mexican households.

We build the three indexes by adding the number of "Yes" answers. Then, we divide the number of "Yes" answers by the number of questions associated to each index. The three indexes can take values between 0 and 1. The higher the value, the higher the degree of use and access to financial products.

We analyze and compare the degree of financial inclusion among households with the estimated indexes. Here we divide the households into the ones that have workers with and without labor benefits. Workers with benefits include employees and workers with entrepreneurial activities. Workers without benefits include free-lance workers, per-day workers and workers without monetary wages.

b) The Logit model

We use this model to estimate the effects of the supply-side, demand-side and socioeconomic determinants on the access and use of savings and credit products. We estimate four logit regression sets. Each regression set includes eleven regressions. The first set includes data for the year 2012. The second regression set includes data for the year 2015. The third regression set includes data for the year 2018. The fourth regression set includes data for the three years. For estimations purposes, the last set includes two additional dummies for the years 2015 and 2018. In this context, year 2012 is considered as the reference category. The four regression sets use the eleven question dummies as the dependent variables (See table 1). See table 2 for the determinants used as explanatory variables in the regressions.

Table 1
Question dummies

Variable	full name	Questions for Informal Savings Products
		Since February until today...
PSI1	Informal Saving Product 1	Do you save money with your family?
PSI2	Informal Saving Product 2	Do you save money in a bank savings?
PSI3	Informal Saving Product 3	Do you lend money?
PSI4	Informal Saving Product 4	Do you save money at home?
PSI5	Informal Saving Product 5	Do you save money in a rosca?
		Questions for Informal Credit Products
		Since april 2011 until today, do you borrow money from...
PCI1	Informal Credit Product 1	Bank savings?
PCI2	Informal Credit Product 2	Pawnshop?
PCI3	Informal Credit Product 3	Friends or colleagues?
PCI4	Informal Credit Product 4	Family?
PCI5	Informal Credit Product 5	¿Do you have a group/community credit?
PCI6	Informal Credit Product 6	Other

c) The Generalized Linear model (GLM)

We use this model to estimate the effects of the supply-side, demand-side and socioeconomic determinants on the access and use of savings, credit and financial inclusion. We estimate four GLM regression sets under the assumption that each regression has errors that are distributed binomially and that exists a logistic link function. The first and second regression sets include data for households with workers with labor benefits. The third and fourth regression sets include data for households with workers without benefits. The regression sets use the three indexes (savings, credit, and financial inclusion indexes) as dependent variables. Like before, the fourth regression includes two additional dummies for the years 2015 and 2018. Again, see Table 2 for the determinants used in the regressions.

Table 2
Explanatory variables

Variable	full name	kind of variable
year	year	2012, 2015 y 2018
d2015	Dummy 2015	Dummy: 1 if 2015 and 0 if 2012 or 2018
d2018	Dummy 2018	Dummy: 1 if 2018 and 0 if 2012 or 2015
woman	Woman	Dummy: 1 if woman 0 if man
age	Age	Years old
age^2	Squared age	age times squared
hsize	household size	Number of relatives of the surveyed individual
hheads	household head	Dummy: 1 if household head 0 otherwise
mofu	married or free union	Dummy: 1 if free union (1) or married (5) and 0 otherwise
edlevel	Educational level	None (0)
		kinder garden (1)
		Primary school (2)
		Middle school (3)
		Technical career (4)
		Normal basic (5)
		High school (6)
		Higher technical career(7)
		Bachelor's degree (8)
		Masters or PhD (9)
edlevel2	Squared educational level	Educational level times squared
wrem	With remittances	Dummy: 1 if receive money 0 otherwise
hws	Household with savings	Dummy: 1 if save money 0 otherwise
crshock	Capacity response to shocks	Dummy: 1 if the answer is yes 0 otherwise
locsize	Location with less than 15,000 population	Dummy: 1 if location is less than 15, 000 population 0 otherwise
labincom	Labor incomes	Dummy: 1 if receive income for his job 0 otherwise
numbb	Number of bank branches	Information from CNBV
numbc	Number of bank correspondents	Information from CNBV

Analyses of the Data

This section is divided in three subsections. The first subsection shows the estimations regarding the descriptive statistics of the households´ data. The second subsection shows the estimations of the four logit regression sets. These regressions allow us to analyze the effects of the demand-side, supply-side and socioeconomic determinants on the access and use of specific financial products. The third subsection shows the estimations of the two GLM regression sets. These regressions allow us to analyze the effects of the determinants on savings, credit and financial inclusion.

a) Descriptive Statistics

This subsection shows, analyses and compares the estimations regarding the descriptive statistics of households´ data. We organize the estimations considering the three financial indexes used (savings, credit and financial inclusion) and the periods analyzed (2012, 2015, 2018 and 2012-2015-2018). For simplicity, the estimations are grouped by tables. Particularly, Table 3 shows the descriptive statistics associated to the households that have workers with labor benefits. Table 4 shows the descriptive statistics associated to the households that do not have workers with benefits.

Table 3
Descriptive-statistics for data of households
with workers with benefits

Variable	Grouped Data Obs	Mean	Std. Dev.	ENIF 2012 Obs	Mean	Std. Dev.	ENIF 2015 Obs	Mean	Std. Dev.	ENIF 2018 Obs	Mean	Std. Dev.
isci	10966	0.1470362	0.1288842	2495	0.1211404	0.1234805	2804	0.1494805	0.1244135	5667	0.1572278	0.1318156
isi	10966	0.2040854	0.2033681	2495	0.1566333	0.1908783	2804	0.2049215	0.1925217	5667	0.2245633	0.2103654
ici	10966	0.0995256	0.1383899	2495	0.0915884	0.1388762	2804	0.103311	0.1386096	5667	0.1011471	0.1379551
psi1	10966	0.1056903	0.3074549	2495	0.0841683	0.2776958	2804	0.10699	0.3091557	5667	0.1145227	0.3184731
psi2	10966	0.2086449	0.4063585	2495	0.1018036	0.3024505	2804	0.2253923	0.4179149	5667	0.2473972	0.4315376
psi3	10966	0.0848076	0.2786079	2495	0.1186373	0.323426	2804	0.0595578	0.2367079	5667	0.0824069	0.2750079
psi4	10966	0.3809958	0.4856537	2495	0.2977956	0.4573808	2804	0.386234	0.4869721	5667	0.4150344	0.4927714
psi5	10966	0.2402882	0.4272779	2495	0.1807615	0.3848976	2804	0.2464337	0.4310109	5667	0.2634551	0.440546
pci1	10966	0.1072406	0.309433	2495	0.0873747	0.28244	2804	0.1159058	0.3201691	5667	0.1116993	0.3150239
pci2	10966	0.068758	0.2530537	2495	0.0757515	0.2646531	2804	0.0834522	0.2766139	5667	0.0584083	0.2345347
pci3	10966	0.1581251	0.3648749	2495	0.1523046	0.3593879	2804	0.1380171	0.3449795	5667	0.170637	0.3762247
pci4	10966	0.2328105	0.4226418	2495	0.1983968	0.3988725	2804	0.2453638	0.4303794	5667	0.2417505	0.4281817
pci5	10966	0.0131315	0.1138431	2495	0.012024	0.1090148	2804	0.0167618	0.1284005	5667	0.0118228	0.1080977
pci6	10966	0.0170527	0.1294737	2495	0.0236473	0.1519781	2804	0.0203281	0.1411452	5667	0.0125287	0.111238

Notes: isci = informal saving and credit index, isi = informal saving index, ici = informal credit index, psi = informal saving product, pci = informal credit product

Table 3 shows the descriptive statistics for workers with benefits (employees and entrepreneurs). The table shows that the savings and the credit indexes rose during the analyzed period. Almost always, the savings index is almost two times higher than the credit one. Furthermore, for the whole period, the value of the saving index (isi=0.2040) is higher than the value of the credit index (ici=0.0945).

We should point out that the households use different savings and credit products. Specifically, the most popular savings products are saving money at home (psi4=0.3809) and saving in a ROSCA (ps15=0.2402). The most popular credit products are borrowing money from relatives

(pci4=0.2328) and borrowing money from friends and colleagues (pci3 =0.1581).

Table 4
Descriptive-statistics for data of households
with workers without benefits

	Grouped Data			ENIF 2012			ENIF 2015			ENIF 2018		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
isci	6727	0.1219529	0.1182561	1829	0.0983555	0.1094833	1574	0.1229525	0.1155415	3324	0.1344639	0.1221838
isi	6727	0.1535306	0.179268	1829	0.10924	0.1596869	1574	0.1562897	0.1738695	3324	0.1765945	0.1873353
ici	6727	0.095665	0.1337392	1829	0.0893077	0.1317846	1574	0.0951985	0.1328554	3324	0.0993839	0.1351215
psi1	6727	0.0723948	0.2591598	1829	0.0524877	0.2230694	1574	0.068615	0.2528786	3324	0.0851384	0.2791295
psi2	6727	0.0689758	0.2534318	1829	0.0393658	0.1945168	1574	0.0698856	0.2550352	3324	0.0848375	0.2786817
psi3	6727	0.0612457	0.2397983	1829	0.0601422	0.237815	1574	0.045108	0.207607	3324	0.0694946	0.2543316
psi4	6727	0.3884347	0.4874305	1829	0.2815746	0.44989	1574	0.4269377	0.4947903	3324	0.4290012	0.495008
psi5	6727	0.1766018	0.3813597	1829	0.1126299	0.3162263	1574	0.1709022	0.3765431	3324	0.2145006	0.4105372
pci1	6727	0.0560428	0.2300215	1829	0.0683434	0.2524032	1574	0.0393901	0.1945831	3324	0.05716	0.2321831
pci2	6727	0.0685298	0.2526716	1829	0.0617824	0.2408257	1574	0.0787802	0.269481	3324	0.0673887	0.2507317
pci3	6727	0.1658986	0.3720173	1829	0.1596501	0.3663814	1574	0.1486658	0.3558718	3324	0.177497	0.3821462
pci4	6727	0.2409692	0.4277035	1829	0.1968289	0.3977106	1574	0.2547649	0.4358675	3324	0.2587244	0.4379998
pci5	6727	0.012041	0.1090771	1829	0.0103882	0.1014194	1574	0.0165184	0.1274986	3324	0.0108303	0.1035193
pci6	6727	0.0304742	0.1719009	1829	0.038819	0.1932163	1574	0.0330368	0.1787896	3324	0.0246691	0.1551378

Notes: isci = informal saving and credit index, isi = informal saving index, ici = informal credit index, psi = informal saving product, pci = informal credit product

Table 4 shows the descriptive statistics for workers without benefits (free-lance workers, per-day workers and workers without monetary wages). The table shows that the savings and the credit indexes rose during the analyzed period. Again, the savings index is higher than the credit one. Furthermore, for the whole period, the value of the saving index (isi=0.1535) is higher than the value of the credit index (ici=0.0956).

We should point out that, again, the households use different savings and credit products. Again, the most popular savings products are saving money at home (psi4=0.3884) and saving in a ROSCA (ps15=0.1766). The most popular credit products are borrowing money from relatives (pci4=0.2409) and borrowing money from friends and colleagues (pci3 =0.1658).

We can summarize our findings by indicating that the access and use of informal financial products have been similar among Mexican households. In both types of households, the savings and the credit indexes have risen during the analyzed period and the savings indexes are higher than the credit ones. Furthermore, in both types, the most popular savings products have been saving money at home and saving in a ROSCA. The most popular credit products have been borrowing money from relatives and borrowing money from friends and colleagues. However, we empha-

size that households with workers with benefits have had a higher level of financial inclusion than households with workers without benefits.

b) Logit analysis of the determinants of financial products

This subsection shows, analyses and compares the estimations regarding the effects of the determinants on the access and use of savings and credit products. For simplicity, the estimations of the logit regression sets are grouped by tables. Particularly, Table 5 shows the estimations for savings products of households with labor benefits. Table 6 shows the estimations for savings products of households without benefits. Table 7 shows the estimations for credit products of households with labor benefits. Table 8 shows the estimations for credit products of households without benefits. In all the regressions, we include the gender variable (woman) given the importance of such variable in the microfinance literature.

Table 5

Determinants of the use and access of savings products
for households with workers with benefits

Grouped Data

Variable	Family Coef.	Savings bank Coef.	Lend of money Coef.	Saving money at home Coef.	roscas Coef.
d2015	-0.078	0.602 ***	-1.317 ***	-0.073	0.134
	(0.118)	(0.102)	(0.121)	(0.084)	(0.089)
d2018	0.113	0.709 ***	-0.879 ***	-0.049	0.393 ***
	(0.136)	(0.117)	(0.137)	(0.099)	(0.104)
woman	-0.046	-0.039	-0.209 ***	-0.084 *	0.057
	(0.064)	(0.051)	(0.071)	(0.046)	(0.048)
age	-0.001	0.009 *	0.008	-0.003	0.005
	(0.006)	(0.005)	(0.006)	(0.004)	(0.004)
age2	0.000	0.000 *	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
hsize	0.000	-0.001	-0.011	0.022 *	0.003
	(0.017)	(0.014)	(0.019)	(0.012)	(0.013)
hheads	0.117 ***	-0.044	0.061	0.075 ***	-0.016
	(0.033)	(0.028)	(0.038)	(0.025)	(0.026)
mofu	0.015	0.012	-0.041 *	0.001	-0.036 **
	(0.022)	(0.017)	(0.025)	(0.016)	(0.016)
edlevel	0.328 ***	0.410 ***	0.312 ***	0.186	0.112 *
	(0.085)	(0.070)	(0.095)	(0.056)	(0.059)
edlevel2	-0.030 ***	-0.024 ***	-0.025 ***	-0.024 ***	-0.013 **
	(0.008)	(0.007)	(0.009)	(0.005)	(0.006)
hws	2.120 ***	2.813 ***	1.887 ***	3.049 ***	2.524 ***
	(0.124)	(0.112)	(0.173)	(0.076)	(0.081)
crshock	0.205	0.199	0.431 ***	0.225 **	-0.082
	(0.141)	(0.129)	(0.131)	(0.096)	(0.102)
locsize	0.016	-0.160 ***	-0.032	0.016	0.009
	(0.070)	(0.057)	(0.077)	(0.050)	(0.052)
labincom	0.745 ***	0.060	0.552 ***	0.598 ***	0.444 ***
	(0.202)	(0.119)	(0.210)	(0.113)	(0.125)
numbb	0.000 **	0.000 ***	-0.001 ***	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
numbc	0.000	0.000 **	0.000 **	0.000 **	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
_cons	-5.260 ***	-5.737 ***	-4.582 ***	-3.807 ***	-3.673 ***
	(0.327)	(0.258)	(0.345)	(0.204)	(0.217)
LR chi2(21)	678.390	2009.370	591.560	3302.810	1510.140
Prob > chi2	0.000	0.000	0.000	0.000	0.000
Log likelihood	-3360.498	-4609.579	-2888.011	-5633.636	-5290.890
Pseudo R2	0.092	0.179	0.093	0.227	0.125
No Obs	10963	10963	10963	10963	10963

ENIF 2012

Variable	Family Coef.	Savings bank Coef.	Lend of money Coef.	Saving money at home Coef.	roscas Coef.
woman	-0.152	-0.054	-0.058	-0.112	-0.299 ***
	(0.147)	(0.136)	(0.129)	(0.094)	(0.106)
age	0.008	0.028 **	0.000	0.004	-0.002
	(0.012)	(0.012)	(0.010)	(0.007)	(0.008)
age2	0.000	0.000 ***	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
hsize	0.009	-0.005	0.023	0.046 *	0.015
	(0.038)	(0.034)	(0.032)	(0.024)	(0.027)
hheads	0.567 ***	-0.185	-0.264 **	-0.254 ***	-0.150
	(0.151)	(0.137)	(0.130)	(0.095)	(0.108)
mofu	-0.235	0.172	-0.217 *	0.325 ***	0.231 **
	(0.149)	(0.141)	(0.130)	(0.096)	(0.111)
edlevel	0.124	0.449 **	0.311 *	0.375 ***	0.470 ***
	(0.185)	(0.184)	(0.171)	(0.118)	(0.136)
edlevel2	-0.011	-0.030 *	-0.021	-0.045 ***	-0.046 ***
	(0.018)	(0.017)	(0.016)	(0.011)	(0.013)
wrem	0.000	0.137	-0.216	0.153	0.000
	(0.240)	(0.214)	(0.220)	(0.149)	(0.172)
hws	0.403 **	0.315 **	0.825 ***	1.107 ***	0.300 ***
	(0.164)	(0.152)	(0.149)	(0.103)	(0.115)
crshock	0.617 ***	0.681 ***	0.585 ***	0.707 ***	0.349 ***
	(0.159)	(0.147)	(0.137)	(0.099)	(0.114)
locsize	0.047	-0.101	-0.022	-0.062	-0.031
	(0.150)	(0.139)	(0.131)	(0.096)	(0.108)
labincom	0.438	0.264	0.877	1.221 ***	1.855 **
	(0.605)	(0.481)	(0.604)	(0.448)	(0.724)
numbb	0.000	0.000	-0.002 **	0.002 ***	0.005 *
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
numbc	0.000	0.000	0.000	0.000	0.000 **
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
_cons	-2.876 ***	-4.592 ***	-4.152 ***	-3.290 ***	-4.385 ***
	(0.780)	(0.697)	(0.759)	(0.547)	(0.809)
LR chi2(15)	75.160	91.410	142.960	322.000	78.330
Prob > chi2	0.000	0.000	0.000	0.000	0.000
Log likelihood	-683.060	-775.220	-837.202	-1358.415	-1139.838
Pseudo R2	0.052	0.056	0.079	0.106	0.033
No Obs	2495	2495	2495	2495	2495

ENIF 2015

Variable	Family Coef.	Savings bank Coef.	Lend of money Coef.	Saving money at home Coef.	roscas Coef.
woman	-0.315 **	0.015	-0.546 ***	-0.229 **	0.584 ***
	(0.145)	(0.115)	(0.185)	(0.108)	(0.110)
age	-0.081 **	0.080 ***	0.086	-0.145 ***	0.075 ***
	(0.038)	(0.028)	(0.058)	(0.027)	(0.027)
age2	0.000	-0.001 **	-0.002 **	0.002 ***	-0.001 ***
	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)
hsize	0.030	0.030	0.003	0.024	0.014
	(0.032)	(0.026)	(0.042)	(0.024)	(0.024)
hheads	-0.303 **	0.050	0.177	-0.128	0.262 **
	(0.152)	(0.119)	(0.193)	(0.112)	(0.114)
mofu	-0.050	0.146	-0.709 ***	-0.013	0.053
	(0.139)	(0.108)	(0.180)	(0.102)	(0.104)
edlevel	-0.283 *	0.382 ***	-0.002	0.022	-0.058
	(0.166)	(0.134)	(0.228)	(0.119)	(0.122)
edlevel2	0.027 *	-0.020	0.010	-0.009	0.003
	(0.016)	(0.013)	(0.021)	(0.011)	(0.012)
wrem	0.035	-0.295	0.066	-0.061	-0.143
	(0.220)	(0.187)	(0.277)	(0.167)	(0.171)
hws	0.000	0.000	0.000	0.000	0.000
	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
crshock	-0.009	0.499	1.425	-0.144	0.477
	(0.403)	(0.331)	(1.021)	(0.279)	(0.303)
locsize	-0.239	-0.381 ***	0.093	0.238 **	-0.034
	(0.150)	(0.120)	(0.190)	(0.110)	(0.111)
labincom	-0.031	0.530	0.385	0.637 *	0.230
	(0.498)	(0.362)	(0.747)	(0.342)	(0.350)
numbb	0.000	-0.001 **	-0.001	0.000	0.001 *
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
numbc	0.000	0.000 *	0.000	0.000	0.000 *
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
_cons	1.516	-4.797 ***	-4.689 ***	2.941 ***	-2.675 ***
	(0.962)	(0.776)	(1.661)	(0.698)	(0.718)
LR chi2(14)	97.570	135.330	69.640	92.500	52.430
Prob > chi2	0.000	0.000	0.000	0.000	0.000
Log likelihood	-777.506	-1135.097	-529.401	-1240.166	-1212.891
Pseudo R2	0.059	0.056	0.062	0.036	0.021
No Obs	1886	1886	1886	1886	1886

ENIF 2018

Variable	Family Coef.	Savings bank Coef.	Lend of money Coef.	Saving money at home Coef.	roscas Coef.
woman	0.038	-0.042	-0.222	-0.024	-0.017
	(0.087)	(0.068)	(0.099)	(0.065)	(0.066)
age	0.003	0.002	0.013	-0.001	0.002
	(0.007)	(0.008)	(0.008)	(0.005)	(0.005)
age2	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
hsize	-0.012	-0.020	-0.041	0.008	-0.010
	(0.024)	(0.019)	(0.026)	(0.018)	(0.018)
hheads	0.190 ***	-0.068 **	0.099 **	0.114 ***	-0.023
	(0.035)	(0.030)	(0.041)	(0.030)	(0.029)
mofu	-0.008	0.002	-0.011	0.001	-0.049 ***
	(0.023)	(0.018)	(0.026)	(0.017)	(0.017)
edlevel	0.528 ***	0.470 ***	0.321 **	0.308	0.029
	(0.122)	(0.095)	(0.135)	(0.083)	(0.084)
edlevel2	-0.050 ***	-0.028 ***	-0.031 **	-0.016 **	-0.005
	(0.012)	(0.009)	(0.013)	(0.008)	(0.008)
hws	0.000	0.000	0.000	0.000	0.000
	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
crshock	0.000	0.000	0.000	0.000	0.000
	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
locsize	0.120	-0.086	-0.011	-0.022	0.097
	(0.098)	(0.078)	(0.113)	(0.075)	(0.075)
labincom	0.801 ***	-0.068	0.354	0.486 ***	0.348 **
	(0.242)	(0.139)	(0.239)	(0.134)	(0.145)
numbb	0.000	-0.001 ***	-0.001 *	0.000	0.000 **
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
numbc	0.000	0.000 ***	0.000	0.000	0.000 **
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
_cons	-3.839 ***	-1.704 ***	-2.956 ***	-0.453 *	-0.633 **
	(0.398)	(0.284)	(0.423)	(0.255)	(0.261)
LR chi2(12)	74.140	190.740	30.540	64.800	28.720
Prob > chi2	0.000	0.000	0.002	0.000	0.004
Log likelihood	-1727.184	-2472.428	-1419.827	-2632.085	-2603.791
Pseudo R2	0.021	0.037	0.011	0.012	0.006
No Obs	3948	3948	3948	3948	3948

Notes: asterics denote significance level *0.10, **0.05 y ***0.01 The standar errors are shown in parethesis
hsize= householdsize, hheads= household heads, mofu= married or free union, edlevel= educational level, wrem= with remittances, hws= household with savings, crshock= capacity response to shocks
locsize= location size, labincom= with labor income, numbb= number of bank branches, numbc= number of bank correspondents, _cons= constant

Table 6
Determinants of the use and access of savings products
for households with workers without benefits

Grouped Data

Variable	Family Coef.		Savings bank Coef.		Lend of money Coef.		Saving money at home Coef.		roscas Coef.	
d2015	-0.452	**	-0.146		-1.086	***	-0.277	**	-0.158	
	(0.180)		(0.192)		(0.191)		(0.123)		(0.135)	
d2018	-0.693	***	-0.273		-1.005	***	-0.622	***	0.012	
	(0.234)		(0.243)		(0.237)		(0.159)		(0.171)	
woman	0.033		0.006		0.092		0.019		0.132	*
	(0.098)		(0.100)		(0.105)		(0.063)		(0.069)	
age	-0.006		-0.020	**	-0.005		-0.003		0.011	*
	(0.008)		(0.009)		(0.009)		(0.005)		(0.006)	
age2	0.000		0.000	**	0.000		0.000		0.000	**
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
hsize	0.008		0.014		0.022		0.002		-0.014	
	(0.026)		(0.026)		(0.027)		(0.017)		(0.018)	
hheads	0.116	**	0.040		0.191	***	0.092	**	-0.026	
	(0.053)		(0.056)		(0.055)		(0.038)		(0.040)	
mofu	0.038		0.001		-0.046		0.007		-0.025	
	(0.034)		(0.036)		(0.036)		(0.022)		(0.024)	
edlevel	0.223	**	0.475	***	0.097	***	-0.027	*	0.446	***
	(0.103)		(0.116)		(0.024)		(0.015)		(0.074)	
edlevel2	-0.013		-0.036	***	-0.001	**	0.000		-0.043	***
	(0.011)		(0.012)		(0.000)		(0.000)		(0.008)	
hws	2.110	***	2.252	***	2.079	***	3.226	***	2.316	***
	(0.164)		(0.182)		(0.171)		(0.083)		(0.106)	
crshock	0.607	***	0.692	***	0.641	***	0.294	**	0.193	
	(0.211)		(0.241)		(0.113)		(0.127)		(0.147)	
locsize	-0.089		-0.232	**	-0.162		-0.057		-0.197	***
	(0.105)		(0.110)		(0.113)		(0.067)		(0.075)	
labincom	0.499	***	-0.242	**	0.256	*	0.178	**	0.392	***
	(0.143)		(0.122)		(0.147)		(0.082)		(0.096)	
numbb	0.000		0.000		-0.001	**	0.000		0.000	
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
numbc	0.000		0.000		0.000		0.000	*	0.000	
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
_cons	-5.319	***	-5.406	***	-4.536	***	-2.467	***	-4.661	***
	(0.355)		(0.385)		(0.319)		(0.178)		(0.248)	
LR chi2(16)	403.590		447.020		354.020		2701.980		990.920	
Prob > chi2	0.000		0.000		0.000		0.000		0.000	
Log likelihood	-1535.230		-1451.643		-1367.569		-3116.493		-2617.695	
Pseudo R2	0.116		0.133		0.115		0.302		0.159	
No Obs	6688		6688		6688		6688		6688	

ENIF 2012

Variable	Family Coef.		Savings bank Coef.		Lend of money Coef.		Saving money at home Coef.		roscas Coef.	
woman	0.212		0.069		0.047		0.107		-0.141	
	(0.217)		(0.247)		(0.206)		(0.114)		(0.152)	
age	-0.002		-0.025		0.037	**	0.006		0.009	
	(0.016)		(0.017)		(0.017)		(0.008)		(0.011)	
age2	0.000		0.000		0.000	**	0.000		0.000	
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
hsize	0.029		-0.047		0.089	*	-0.016		0.034	
	(0.052)		(0.063)		(0.048)		(0.028)		(0.037)	
hheads	-0.489	**	-0.461	*	0.144		-0.433	***	-0.354	**
	(0.221)		(0.254)		(0.213)		(0.116)		(0.156)	
mofu	-0.205		-0.186		-0.250		-0.043		-0.039	
	(0.224)		(0.256)		(0.212)		(0.120)		(0.161)	
edlevel	0.470	**	0.098		0.330		0.136		0.462	***
	(0.237)		(0.239)		(0.213)		(0.103)		(0.165)	
edlevel2	-0.042	*	0.001		-0.024		-0.018		-0.035	**
	(0.025)		(0.025)		(0.022)		(0.011)		(0.017)	
wrem	-0.038		0.241		0.167		0.174		0.057	
	(0.329)		(0.348)		(0.298)		(0.170)		(0.230)	
hws	0.469	**	0.288		0.965	***	1.239	***	0.256	
	(0.234)		(0.270)		(0.225)		(0.121)		(0.168)	
crshock	1.087	***	1.239	***	0.921	***	0.823	***	0.671	***
	(0.233)		(0.272)		(0.221)		(0.124)		(0.165)	
locsize	0.051		0.028		0.243		-0.097		-0.236	
	(0.218)		(0.250)		(0.207)		(0.115)		(0.156)	
labincom	0.915	*	0.270		0.595		0.446	**	0.981	***
	(0.478)		(0.423)		(0.416)		(0.202)		(0.331)	
numbb	0.001		0.001		-0.004	***	0.003	***	0.001	
	(0.001)		(0.001)		(0.001)		(0.001)		(0.001)	
numbc	0.000		0.000		0.000	***	0.000	***	0.000	
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
_cons	-5.055	***	-3.602	***	-5.454	***	-1.914	***	-4.286	***
	(0.756)		(0.738)		(0.709)		(0.338)		(0.526)	
LR chi2(15)	67.790		55.100		104.900		271.900		83.780	
Prob > chi2	0.000		0.000		0.000		0.000		0.000	
Log likelihood	-342.470		-275.923		-363.388		-951.269		-601.879	
Pseudo R2	0.090		0.091		0.126		0.125		0.065	
No Obs	1829		1829		1829		1829		1829	

ENIF 2015

Variable	Family Coef.		Savings bank Coef.		Lend of money Coef.		Saving money at home Coef.		roscas Coef.	
woman	-0.112		0.233		0.224		-0.393	**	0.546	***
	(0.231)		(0.230)		(0.273)		(0.170)		(0.170)	
age	-0.082		-0.028		-0.056		-0.089	**	0.136	***
	(0.051)		(0.052)		(0.063)		(0.039)		(0.041)	
age2	0.001		0.001		0.000		0.001	**	-0.002	***
	(0.001)		(0.001)		(0.001)		(0.000)		(0.000)	
hsize	0.070		-0.079		-0.013		0.035		-0.059	
	(0.051)		(0.054)		(0.063)		(0.038)		(0.039)	
hheads	-0.220		0.143		0.033		-0.215		-0.138	
	(0.252)		(0.248)		(0.301)		(0.179)		(0.180)	
mofu	-0.075		0.084		-0.300		-0.111		0.101	
	(0.227)		(0.228)		(0.267)		(0.166)		(0.167)	
edlevel	0.085		0.397	*	0.111		0.094		0.448	***
	(0.211)		(0.233)		(0.256)		(0.139)		(0.161)	
edlevel2	-0.009		-0.040		-0.007		-0.003		-0.045	***
	(0.022)		(0.024)		(0.027)		(0.015)		(0.017)	
wrem	0.079		0.939	***	-0.043		-0.272		-0.029	
	(0.337)		(0.279)		(0.404)		(0.235)		(0.250)	
hws	0.000		0.000		0.000		0.000		0.000	
	(omitted)		(omitted)		(omitted)		(omitted)		(omitted)	
crshock	0.414		1.036		1.156		-0.240		0.443	
	(0.617)		(0.739)		(1.023)		(0.361)		(0.389)	
locsize	-0.155		-0.791	***	0.144		0.105		-0.318	*
	(0.233)		(0.281)		(0.281)		(0.168)		(0.168)	
labincom	0.779	**	-0.095		0.228		-0.402	**	0.772	***
	(0.326)		(0.264)		(0.337)		(0.203)		(0.219)	
numbb	-0.003	***	0.000		0.000		0.000		-0.001	
	(0.001)		(0.001)		(0.001)		(0.001)		(0.001)	
numbc	0.000	***	0.000		0.000		0.000		0.000	
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
_cons	-1.170		-2.736	**	-2.439		3.210	***	-5.470	***
	(1.265)		(1.393)		(1.701)		(0.949)		(1.015)	
LR chi2(14)	32.540		36.000		17.960		28.240		80.640	
Prob > chi2	0.003		0.001		0.209		0.013		0.000	
Log likelihood	-317.732		-320.041		-241.887		-535.045		-519.052	
Pseudo R2	0.049		0.053		0.036		0.026		0.072	
No Obs	930		930		930		930		930	

ENIF 2018

Variable	Family Coef.		Savings bank Coef.		Lend of money Coef.		Saving money at home Coef.		roscas Coef.	
woman	-0.030		-0.139		0.055		-0.010		0.003	
	(0.130)		(0.131)		(0.142)		(0.094)		(0.093)	
age	-0.006		-0.021	**	-0.022	**	-0.004		0.008	
	(0.010)		(0.010)		(0.010)		(0.007)		(0.007)	
age2	0.000		0.000	**	0.000	*	0.000		0.000	
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
hsize	-0.030		0.079	**	-0.006		0.006		-0.011	
	(0.037)		(0.035)		(0.040)		(0.026)		(0.026)	
hheads	0.172	***	0.030		0.209	***	0.177	***	-0.009	
	(0.056)		(0.061)		(0.060)		(0.048)		(0.045)	
mofu	0.027		-0.006		-0.044		0.010		-0.040	
	(0.035)		(0.035)		(0.037)		(0.025)		(0.025)	
edlevel	0.057		0.644	***	0.151		0.072		0.425	***
	(0.135)		(0.166)		(0.153)		(0.093)		(0.101)	
edlevel2	0.007		-0.048	***	-0.006		-0.014		-0.042	***
	(0.014)		(0.017)		(0.016)		(0.010)		(0.011)	
hws	0.000		0.000		0.000		0.000		0.000	
	(omitted)		(omitted)		(omitted)		(omitted)		(omitted)	
crshock	0.000		0.000		0.000		0.000		0.000	
	(omitted)		(omitted)		(omitted)		(omitted)		(omitted)	
locsize	-0.066		-0.126		-0.533	**	0.027		-0.029	
	(0.150)		(0.152)		(0.178)		(0.107)		(0.107)	
labincom	0.264		-0.402	***	0.140		0.364	***	0.187	
	(0.150)		(0.150)		(0.181)		(0.114)		(0.118)	
numbb	0.001		0.000		0.000		0.000		0.000	
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
numbc	0.000		0.000		0.000		0.000		0.000	
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
_cons	-2.873	***	-3.215	***	-2.416	***	0.062		-1.605	***
	(0.419)		(0.455)		(0.454)		(0.289)		(0.301)	
LR chi2(12)	42.770		79.950		40.220		35.800		34.130	
Prob > chi2	0.000		0.000		0.000		0.000		0.001	
Log likelihood	-810.990		-790.538		-707.210		-1317.689		-1334.640	
Pseudo R2	0.026		0.048		0.028		0.013		0.013	
No Obs	2115		2115		2115		2115		2115	

Notes: asterics denote significance level *0.10, **0.05 y ***0.01 The standar errors are shown in parethesis
hsize= householdsize, hheads= household heads, mofu= married or free union, edlevel= educational level, wrem= with remittances, hws= household with savings, crshock= capacity response to shocks
locsize= location size, labincom= with labor income, numbb= number of bank branches, numbc= number of bank correspondents, _cons= constant

Tables 5 and 6 show that similar patterns regarding savings among house-
holds with workers with and without benefits. The most important deter-
minants to the access and use of savings products are the level of educa-
tion (edlevel, edlevel2), the response capacity to face shocks (crshock), the
availability of savings (hws) and the existence of labor income (labinc).
Interestingly, the regressions suggest that the level of education has a

positive, but nonlinear, relationship with the access and use of savings products. The estimations also suggest that the access and use of savings products changed in time and that the constant is negative. Furthermore, the estimations do not show that women have advantages with respect to men regarding the use and access of savings products. The gender variable usually is not significant or has a negative sign.

Tables 7 and 8 show that similar patterns regarding credit among households with workers with and without benefits. Again, the most important determinants to the access and use of credit products are the level of education (edlevel, edlevel2), the availability of savings (hws) and the existence of labor income (labinc). Again, the regressions suggest that the level of education has a positive, but nonlinear, relationship with the access and use of credit products. The estimations also suggest that the access and use of credit products changed in time and that the constant is negative. However, the estimations do show that women have advantages with respect to men regarding the use and access of group/community credit products. Moreover, women in households without benefits have advantages with respect to men regarding the use and access of certain credit products. These products relate to banking and pawnshop services.

Table 7

Determinants of the use and access of credit products
for households with workers with benefits

Grouped Data

Variable	Savings Bank Coef.	Pawnshop Coef.	Friends/Colleagues Coef.	Family Coef.	Group/Community Credit Coef.	Other Coef.
d2015	0.283 **	0.171	-0.009	0.342 ***	0.498 *	0.704 **
	(0.118)	(0.134)	(0.100)	(0.086)	(0.266)	(0.317)
d2018	0.471 ***	0.035	0.368 ***	0.353 ***	0.386	0.593
	(0.139)	(0.164)	(0.115)	(0.102)	(0.327)	(0.401)
woman	-0.025	0.036	-0.083	-0.007	0.555 ***	-0.095
	(0.063)	(0.076)	(0.053)	(0.046)	(0.154)	(0.169)
age	0.001	-0.004	-0.005	-0.003	-0.013	-0.007
	(0.006)	(0.007)	(0.005)	(0.004)	(0.013)	(0.014)
age2	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
hsize	-0.015	0.034 *	0.008	0.020 *	0.058	0.020
	(0.017)	(0.019)	(0.014)	(0.012)	(0.036)	(0.043)
hheads	-0.071 **	0.015	0.047 *	0.058 **	-0.051	-0.293 **
	(0.036)	(0.045)	(0.029)	(0.025)	(0.098)	(0.120)
mofu	-0.034	-0.074 ***	-0.043 **	-0.024	-0.094	0.043
	(0.022)	(0.028)	(0.018)	(0.016)	(0.058)	(0.064)
edlevel	0.241 ***	0.317 ***	0.137 **	0.239 ***	0.178	0.203
	(0.080)	(0.096)	(0.064)	(0.056)	(0.180)	(0.204)
edlevel2	-0.017 **	-0.034 ***	-0.016 ***	-0.023 ***	-0.032 *	-0.031
	(0.008)	(0.009)	(0.006)	(0.005)	(0.018)	(0.020)
hws	0.624 ***	0.057	0.123 **	0.272 ***	0.254	-0.026
	(0.076)	(0.084)	(0.059)	(0.052)	(0.167)	(0.183)
crshock	-0.180	-0.201	-0.219 **	-0.218 **	-0.440 *	-0.633 **
	(0.128)	(0.139)	(0.104)	(0.091)	(0.252)	(0.315)
locsize	-0.089	-0.084	0.015	-0.021	-0.081	-0.230
	(0.069)	(0.083)	(0.057)	(0.050)	(0.162)	(0.191)
labincom	0.242	0.777 ***	0.639 ***	0.919 ***	0.222	0.929
	(0.153)	(0.246)	(0.146)	(0.131)	(0.462)	(0.592)
numbb	0.000 **	-0.001 ***	0.000 **	0.000	0.002 **	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
numbc	0.000	0.000 **	0.000	0.000 *	0.000 ***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
_cons	-3.241 ***	-3.511 ***	-2.276 ***	-2.779 ***	-3.842 ***	-4.985 ***
	(0.272)	(0.358)	(0.227)	(0.204)	(0.664)	(0.815)
LR chi2(16)	175.190	98.030	105.860	168.110	113.240	41.810
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Log likelihood	-5648.254	-2696.815	-4733.734	-5865.851	-890.086	-746.019
Pseudo R2	0.023	0.018	0.011	0.014	0.060	0.027
No Obs	10963	10963	10963	10963	10963	10963

ENIF 2012

Variable	Savings Bank Coef.	Pawnshop Coef.	Friends/Colleagues Coef.	Family Coef.	Group/Community Credit Coef.	Other Coef.
woman	-0.035	-0.195	0.036	-0.084	0.156	-0.783 **
	(0.143)	(0.153)	(0.113)	(0.102)	(0.268)	(0.393)
age	0.007	-0.002	-0.007	-0.009	-0.022	-0.005
	(0.012)	(0.012)	(0.009)	(0.008)	(0.019)	(0.028)
age2	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
hsize	0.016	-0.006	0.006	-0.002	0.118 *	0.043
	(0.036)	(0.039)	(0.029)	(0.026)	(0.062)	(0.092)
hheads	0.130	-0.050	0.103	-0.004	-0.588 **	-0.782 **
	(0.147)	(0.156)	(0.115)	(0.104)	(0.272)	(0.366)
mofu	0.333 **	0.484 ***	-0.095	0.136	0.061	0.533
	(0.153)	(0.168)	(0.116)	(0.106)	(0.277)	(0.409)
edlevel	0.306 *	0.343 *	0.098	0.401 ***	0.254	0.595
	(0.181)	(0.188)	(0.131)	(0.126)	(0.324)	(0.499)
edlevel2	-0.022	-0.037 **	-0.010	-0.040 ***	-0.042	-0.072
	(0.017)	(0.019)	(0.013)	(0.012)	(0.033)	(0.051)
hws	0.114	0.279 *	-0.143	-0.269	-0.900	0.153
	(0.225)	(0.228)	(0.190)	(0.177)	(0.605)	(0.500)
crshock	-0.161	-0.284 *	-0.373 ***	-0.390 ***	-0.356	-0.900 **
	(0.158)	(0.173)	(0.127)	(0.114)	(0.310)	(0.457)
labincom	-0.241	0.472	0.545	1.345 ***	0.280	0.000
	(0.444)	(0.403)	(0.457)	(0.523)	(1.025)	(omitted)
numbb	-0.001 *	0.001 *	0.000	0.000	0.003 *	-0.003
	(0.001)	(0.001)	(0.001)	(0.000)	(0.002)	(0.002)
numbc	0.000	0.000	0.000	0.000	0.000 **	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
_cons	-3.120 ***	-3.289 ***	-1.970 ***	-3.016 ***	-3.354 **	-5.123 ***
	(0.640)	(0.784)	(0.561)	(0.621)	(1.331)	(1.286)
LR chi2(15)	26.050	37.940	26.930	56.960	38.420	20.980
Prob > chi2	0.038	0.001	0.029	0.000	0.001	0.102
Log likelihood	-726.555	-650.357	-1051.117	-1214.458	-260.013	-151.207
Pseudo R2	0.018	0.028	0.013	0.023	0.069	0.065
No Obs	2495	2495	2495	2495	2495	2434

ENIF 2015

Variable	Savings Bank Coef.	Pawnshop Coef.	Friends/Colleagues Coef.	Family Coef.	Group/Community Credit Coef.	Other Coef.
woman	0.151	0.058	-0.230 *	0.118	1.786 ***	0.721 **
	(0.138)	(0.158)	(0.126)	(0.101)	(0.367)	(0.353)
age	0.107 ***	0.078 *	0.107 ***	0.032	-0.054	0.122
	(0.036)	(0.041)	(0.033)	(0.026)	(0.071)	(0.088)
age2	-0.001 ***	-0.001 **	-0.001 ***	-0.001 **	0.001	-0.001
	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)
hsize	0.003	0.075 **	0.053 **	0.034	0.086	0.062
	(0.030)	(0.033)	(0.027)	(0.022)	(0.061)	(0.070)
hheads	0.088	-0.053	0.239 *	0.152	0.287	-0.052
	(0.142)	(0.162)	(0.130)	(0.105)	(0.326)	(0.354)
mofu	0.127	0.219	-0.249 **	0.027	0.370	0.156
	(0.129)	(0.150)	(0.119)	(0.096)	(0.305)	(0.327)
edlevel	0.424 ***	0.212	-0.038	0.385	0.286	0.107
	(0.160)	(0.177)	(0.134)	(0.114)	(0.357)	(0.330)
edlevel2	-0.035 **	-0.028	-0.006	-0.018 *	-0.054	-0.021
	(0.015)	(0.017)	(0.013)	(0.011)	(0.037)	(0.033)
wrem	-0.167	0.359	0.238	0.289 *	0.255	0.467
	(0.229)	(0.225)	(0.189)	(0.154)	(0.421)	(0.452)
hws	0.833 ***	0.339 **	0.149	0.200 *	1.183 ***	-0.345
	(0.156)	(0.164)	(0.126)	(0.103)	(0.400)	(0.312)
crshock	0.633 *	0.395	0.898 ***	0.841 ***	-0.480	-0.356
	(0.355)	(0.358)	(0.323)	(0.247)	(0.553)	(0.500)
locsize	-0.020	-0.412 **	0.116	0.139	-0.475	-0.001
	(0.141)	(0.167)	(0.124)	(0.101)	(0.326)	(0.342)
labincom	0.325	0.853	0.666	0.687 **	0.219	0.000
	(0.383)	(0.597)	(0.431)	(0.318)	(1.036)	(omitted)
numbb	-0.001	-0.001	0.000	0.002 ***	0.003	-0.002
	(0.001)	(0.001)	(0.001)	(0.000)	(0.002)	(0.002)
numbc	0.000	0.000	0.000	0.000 *	0.000 **	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
_cons	-6.880 ***	-5.495 ***	-5.032 ***	-3.574 ***	-4.524 **	-7.084 ***
	(0.918)	(1.083)	(0.853)	(0.662)	(1.882)	(1.979)
LR chi2(15)	88.490	51.670	70.360	108.590	71.270	28.310
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.013
Log likelihood	-961.515	-779.154	-1090.199	-1508.049	-242.842	-222.826
Pseudo R2	0.044	0.032	0.031	0.035	0.128	0.060
No Obs	2804	2804	2804	2804	2804	2700

ENIF 2018

Variable	Savings Bank Coef.	Pawnshop Coef.	Friends/Colleagues Coef.	Family Coef.	Group/Community Credit Coef.	Other Coef.
woman	-0.051	0.146	-0.064	-0.010	0.192	-0.296
	(0.085)	(0.114)	(0.071)	(0.063)	(0.242)	(0.248)
age	-0.006	-0.010	-0.008	-0.003	-0.005	-0.017
	(0.007)	(0.009)	(0.005)	(0.005)	(0.019)	(0.017)
age2	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
hsize	-0.043 *	0.017	-0.022	0.013	-0.047	-0.031
	(0.024)	(0.030)	(0.020)	(0.017)	(0.068)	(0.068)
hheads	-0.118 ***	0.018	0.017	0.065 **	0.052	-0.264 *
	(0.041)	(0.050)	(0.031)	(0.027)	(0.104)	(0.138)
mofu	-0.051 **	-0.110 ***	-0.041 **	-0.033 **	-0.124 **	0.017
	(0.023)	(0.029)	(0.019)	(0.017)	(0.061)	(0.067)
edlevel	0.181 *	0.354 **	0.213 **	0.149 *	0.061	0.241
	(0.111)	(0.149)	(0.089)	(0.078)	(0.276)	(0.315)
edlevel2	-0.010	-0.035 **	-0.023 ***	-0.013 *	-0.014	-0.032
	(0.011)	(0.015)	(0.009)	(0.008)	(0.028)	(0.031)
hws	0.865 ***	0.062	0.228 ***	0.428 ***	0.135	0.121
	(0.115)	(0.129)	(0.082)	(0.074)	(0.277)	(0.278)
crshock	0.000	0.000	0.000	0.000	0.000	0.000
	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
locsize	-0.159	-0.054	0.006	-0.047	0.321	-0.830 **
	(0.100)	(0.130)	(0.081)	(0.072)	(0.256)	(0.347)
labincom	0.279	0.799 ***	0.624 ***	0.905 ***	0.201	0.472
	(0.183)	(0.304)	(0.166)	(0.151)	(0.602)	(0.604)
numbb	0.000	-0.001 *	0.000 *	0.000 **	0.003	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.001)
numbc	0.000	0.000	0.000	0.000	0.000 ***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
_cons	-2.745 ***	-3.703 ***	-2.166 ***	-2.556 ***	-3.312 ***	-4.102 ***
	(0.344)	(0.485)	(0.283)	(0.254)	(0.934)	(1.002)
LR chi2(13)	131.460	45.880	67.200	112.750	43.750	24.630
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.026
Log likelihood	-1917.667	-1238.159	-2555.063	-3077.151	-359.604	-351.581
Pseudo R2	0.033	0.018	0.013	0.018	0.057	0.034
No Obs	5664	5664	5664	5664	5664	5664

Notes: asterics denote significance level *0.10, **0.05 y ***0.01 The standar errors are shown in paresthesis
hsize= householdsize, hheads= household heads, mofu= married or free union, edlevel= educational level, wrem= with remittances, hws= household with savings, crshock= capacity response to shocks
locsize= location size, labincom= with labor income, numbb= number of bank branches, numbc= number of bank correspondents, _cons= constant

Table 8

Determinants of the use and access of credit products
for households with workers without benefits

Grouped Data

Variable	Savings Bank Coef.	Pawnshop Coef.	Friends/Colleagues Coef.	Family Coef.	Group/Community Credit Coef.	Other Coef.
d2015	-0.708 ***	0.189	-0.092	0.283 **	-0.132	0.591
	(0.201)	(0.183)	(0.129)	(0.112)	(0.255)	(0.425)
d2018	-0.465 *	0.016	0.220	0.333 **	-0.872 **	-0.296
	(0.250)	(0.239)	(0.162)	(0.145)	(0.353)	(0.612)
woman	0.289 ***	0.181	0.058	0.086	0.560 ***	0.351
	(0.108)	(0.098)	(0.067)	(0.058)	(0.148)	(0.230)
age	-0.012	-0.001	0.004	0.007	-0.005	-0.005
	(0.009)	(0.008)	(0.006)	(0.005)	(0.012)	(0.019)
age2	0.000	0.000	0.000	0.000 *	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
hsize	0.009	0.028	0.039 **	0.017	-0.001	-0.036
	(0.028)	(0.025)	(0.017)	(0.015)	(0.037)	(0.060)
hheads	-0.041	-0.015	0.066 *	0.081 **	-0.051	-0.377 **
	(0.067)	(0.060)	(0.039)	(0.034)	(0.096)	(0.177)
mofu	-0.051	-0.066 *	-0.072 ***	-0.053 **	-0.007	0.132
	(0.039)	(0.035)	(0.024)	(0.021)	(0.057)	(0.095)
edlevel	0.392 ***	0.352 ***	0.135 **	0.351 ***	0.461 ***	0.644 **
	(0.115)	(0.103)	(0.063)	(0.058)	(0.155)	(0.271)
edlevel2	-0.035 ***	-0.030 ***	-0.018 ***	-0.035 ***	-0.052 ***	-0.075 **
	(0.012)	(0.011)	(0.007)	(0.006)	(0.017)	(0.030)
hws	0.366 ***	0.289 ***	0.191 ***	0.266 ***	0.238	0.323
	(0.119)	(0.107)	(0.072)	(0.062)	(0.156)	(0.246)
crshock	0.209	0.015	0.043	-0.063	0.054	-0.139
	(0.188)	(0.185)	(0.126)	(0.112)	(0.242)	(0.420)
locsize	0.116	-0.085	-0.009	0.106 *	0.213	-0.456 *
	(0.112)	(0.104)	(0.070)	(0.061)	(0.148)	(0.254)
labincom	0.124	0.654 ***	0.551 ***	0.284 ***	0.451 **	0.211
	(0.148)	(0.154)	(0.099)	(0.079)	(0.222)	(0.318)
numbb	0.000	-0.001 **	0.000 *	0.000	0.000	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
numbc	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
_cons	-3.645 ***	-4.022 ***	-2.434 ***	-2.561 ***	-4.622 ***	-5.800 ***
	(0.339)	(0.325)	(0.205)	(0.183)	(0.469)	(0.781)
LR chi2(16)	67.550	77.180	106.290	132.510	61.390	34.090
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.005
Log Likelihood	-1405.287	-1636.565	-2952.688	-3629.570	-885.570	-420.967
Pseudo R2	0.024	0.023	0.018	0.018	0.034	0.039
No Obs	6688	6688	6688	6688	6688	6688

ENIF 2012

Variable	Savings Bank Coef.	Pawnshop Coef.	Friends/Colleagues Coef.	Family Coef.	Group/Community Credit Coef.	Other Coef.
woman	0.655 ***	-0.020	0.295 **	0.117	0.244	0.439
	(0.197)	(0.198)	(0.131)	(0.119)	(0.249)	(0.485)
age	-0.012	0.005	0.008	0.003	0.011	0.004
	(0.014)	(0.017)	(0.010)	(0.009)	(0.019)	(0.040)
age2	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
hsize	0.041	0.074	0.044	-0.010	0.047	-0.181
	(0.044)	(0.046)	(0.031)	(0.030)	(0.058)	(0.136)
hheads	-0.260	-0.457 **	0.202	0.027	-1.219 ***	-0.592
	(0.192)	(0.201)	(0.136)	(0.124)	(0.265)	(0.484)
mofu	0.185	0.764 ***	0.256 *	0.132	0.381	0.444
	(0.206)	(0.244)	(0.142)	(0.129)	(0.284)	(0.534)
edlevel	0.277	0.447 **	0.214 *	0.413 ***	0.463 *	1.677 **
	(0.185)	(0.204)	(0.120)	(0.119)	(0.253)	(0.782)
edlevel2	-0.020	-0.045 **	-0.023 *	-0.037 ***	-0.059 **	-0.186 **
	(0.020)	(0.022)	(0.013)	(0.013)	(0.029)	(0.088)
wrem	-0.018	0.107	0.212	0.138	0.075	-0.901
	(0.290)	(0.300)	(0.189)	(0.176)	(0.370)	(1.034)
hws	-0.154	0.186	-0.109	-0.191	-0.417	0.153
	(0.220)	(0.225)	(0.154)	(0.141)	(0.304)	(0.528)
crshock	0.323	-0.160	-0.015	-0.131	-0.105	-0.540
	(0.212)	(0.233)	(0.154)	(0.143)	(0.294)	(0.596)
locsize	0.282	0.252	0.054	0.006	0.282	-0.070
	(0.190)	(0.199)	(0.131)	(0.120)	(0.247)	(0.474)
labincom	0.595	1.549 ***	0.714 ***	0.468 **	0.652	-0.094
	(0.381)	(0.595)	(0.274)	(0.225)	(0.480)	(0.770)
numbb	0.000	0.000	0.000	0.001	0.002	0.003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
numbc	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
_cons	-4.151 ***	-5.380 ***	-3.171 ***	-2.640 ***	-4.364 ***	-6.533 ***
	(0.606)	(0.792)	(0.419)	(0.373)	(0.793)	(1.837)
LR chi2(15)	35.390	48.090	39.190	29.680	41.410	16.790
Prob > chi2	0.002	0.000	0.001	0.013	0.000	0.331
Log likelihood	-438.333	-399.999	-783.501	-892.296	-279.568	-97.279
Pseudo R2	0.039	0.057	0.024	0.016	0.069	0.080
No Obs	1829	1829	1829	1829	1829	1829

ENIF 2015

Variable	Savings Bank Coef.	Pawnshop Coef.	Friends/Colleagues Coef.	Family Coef.	Group/Community Credit Coef.	Other Coef.
woman	0.069	0.292	-0.335 **	0.229 *	2.293 ***	0.750
	(0.295)	(0.216)	(0.164)	(0.135)	(0.433)	(0.523)
age	0.168	0.085	0.068 *	-0.006	-0.104	0.076
	(0.076)	(0.052)	(0.037)	(0.030)	(0.070)	(0.133)
age2	-0.002	-0.001 *	-0.001 **	0.000	0.001	0.000
	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)
hsize	-0.043	-0.012	0.028	0.009	-0.055	-0.062
	(0.067)	(0.049)	(0.035)	(0.029)	(0.076)	(0.109)
hheads	0.015	0.143	-0.126	0.231	0.710 *	0.548
	(0.306)	(0.228)	(0.172)	(0.143)	(0.366)	(0.547)
mofu	-0.248	0.055	-0.159	0.010	0.046	1.168 **
	(0.282)	(0.210)	(0.156)	(0.130)	(0.339)	(0.568)
edlevel	0.340	0.025	-0.135	0.384	0.917 *	0.419
	(0.292)	(0.195)	(0.134)	(0.122)	(0.313)	(0.524)
edlevel2	-0.033	-0.006	0.015	-0.016	-0.064 *	-0.102 *
	(0.031)	(0.021)	(0.015)	(0.013)	(0.036)	(0.057)
wrem	0.921 ***	0.301	0.421 *	0.263	0.172	-0.205
	(0.326)	(0.291)	(0.218)	(0.190)	(0.415)	(0.756)
hws	0.659 **	0.421 **	0.312 **	0.154	0.886 **	0.419
	(0.302)	(0.208)	(0.155)	(0.125)	(0.354)	(0.429)
crshock	0.387	0.691	0.540 *	0.394	0.000	0.982
	(0.609)	(0.474)	(0.318)	(0.243)	(omitted)	(1.049)
locsize	0.441	-0.667 ***	0.186	0.131	-0.448	-0.798 *
	(0.302)	(0.215)	(0.163)	(0.134)	(0.314)	(0.455)
labincom	0.145	0.520 *	0.213	0.202	0.240	0.429
	(0.549)	(0.282)	(0.190)	(0.153)	(0.387)	(0.565)
numbb	0.001	-0.002 **	0.000	0.000	0.002	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
numbc	0.000	0.000 *	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
_cons	-8.225 ***	-5.074 ***	-3.308 ***	-1.846 ***	-3.348 **	-11.418 ***
	(1.852)	(1.269)	(0.887)	(0.702)	(1.662)	(3.553)
LR chi2(15)	26.540	44.450	38.760	60.590	63.010	30.500
Prob > chi2	0.033	0.000	0.001	0.000	0.000	0.010
Log likelihood	-248.014	-411.854	-642.311	-862.966	-191.951	-117.218
Pseudo R2	0.051	0.051	0.029	0.034	0.141	0.115
No Obs	1574	1574	1574	1574	1432	1574

ENIF 2018

Variable	Savings Bank Coef.	Pawnshop Coef.	Friends/Colleagues Coef.	Family Coef.	Group/Community Credit Coef.	Other Coef.
woman	0.088	0.225	0.049	0.002	0.096	0.407
	(0.151)	(0.141)	(0.092)	(0.068)	(0.226)	(0.346)
age	-0.019 *	-0.003	0.000	0.007	-0.013	0.002
	(0.011)	(0.011)	(0.007)	(0.006)	(0.016)	(0.025)
age2	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
hsize	0.014	0.024	0.045 *	0.041 *	-0.021	-0.063
	(0.041)	(0.038)	(0.025)	(0.018)	(0.063)	(0.089)
hheads	-0.067	-0.015	0.049	0.097 ***	0.097	-0.665 **
	(0.077)	(0.068)	(0.044)	(0.038)	(0.099)	(0.264)
mofu	-0.067 *	-0.103 ***	-0.084 ***	-0.060 ***	-0.037	0.099
	(0.040)	(0.036)	(0.024)	(0.021)	(0.059)	(0.098)
edlevel	0.516 ***	0.470 ***	0.200 **	0.296 ***	0.514 **	0.319
	(0.177)	(0.160)	(0.091)	(0.081)	(0.261)	(0.354)
edlevel2	-0.046 **	-0.037 **	-0.026 ***	-0.032 ***	-0.049 *	-0.038
	(0.018)	(0.016)	(0.010)	(0.009)	(0.027)	(0.038)
hws	0.625 ***	0.295 *	0.271 ***	0.476 ***	0.288	0.584
	(0.180)	(0.156)	(0.100)	(0.088)	(0.253)	(0.392)
crshock	0.000	0.000	0.000	0.000	0.000	0.000
	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
locsize	-0.138	0.037	-0.141	0.135	0.488 **	-0.219
	(0.178)	(0.156)	(0.106)	(0.090)	(0.234)	(0.412)
labincom	-0.067	0.531 ***	0.595 ***	0.276 ***	0.673 **	0.150
	(0.185)	(0.198)	(0.129)	(0.102)	(0.343)	(0.455)
numbb	0.001 **	-0.001	0.000	0.000	0.000	0.001
	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)
numbc	0.000 **	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
_cons	-3.691 ***	-4.052 ***	-2.229 ***	-2.334 ***	-5.209 ***	-5.597 ***
	(0.500)	(0.472)	(0.287)	(0.252)	(0.771)	(1.139)
LR chi2(13)	43.570	51.160	76.780	78.790	29.770	18.760
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.131
Log likelihood	-706.322	-794.746	-1515.444	-1860.397	-369.628	-189.316
Pseudo R2	0.030	0.031	0.025	0.021	0.039	0.047
No Obs	3322	3322	3322	3322	3322	3322

Notes: asterics denote significance level *0.10, **0.05 or ***0.01. The standar errors are shown in parethesis. hsize= householdsize, hhead= household head, mofu= married or free union, edlevel= educational level, wrem= with remittances, hws= household with savings, scr= shocks capacity response. locsize= location size, labincom= with labor income, numbb= number of bank branches, numbc= number of bank corresponsents, _cons= constant

We can summarize our findings by indicating that they confirm that the access and use of informal financial products have been similar among households. In both types of households, the most important determinants to the access and use of savings and credit products have been the level of education, the availability of savings and the existence of labor income. The regressions suggest that the level of education has a positive, but nonlinear, relationship with financial inclusion. The estimations also suggest that the access and use of informal financial products changed in time. However, the findings show that women in households without

benefits have had advantages with respect to men regarding the use and access of banking and pawnshop credit services

c) GLM analysis of the determinants of savings, credit and financial inclusion

This subsection shows, analyses and compares the estimations regarding the effects of the supply-side, demand-side and socioeconomic determinants on the access and use of savings, credit and financial inclusion. For simplicity, the estimations of the GLM regression sets are grouped by tables. Particularly, Table 9 shows the estimations for the savings and credit indexes of households with labor benefits. Table 10 shows the estimations for the financial inclusion index of households with labor benefits. Table 11 shows the estimations for the savings and credit indexes of households without benefits. Table 12 shows the estimations for the financial inclusion index of households without benefits. Again, in all the regressions, we include the gender variable (woman).

Tables 9 and 10 show similar patterns regarding savings, credit and financial inclusion among the households with workers with benefits. The most important determinants of the main indexes are the level of education (edlevel, edlevel2), the availability of savings (hws), the existence of labor income (labinc) and the number of bank branches available (numbb). Again, the regressions suggest that the level of education has a positive, but nonlinear, relationship with the indexes. The estimations also suggest that the access and use of credit increase in time and that the constant is negative. Again, the estimations do not show that women have advantages with respect to men regarding savings, credit nor financial inclusion.

Table 9

Determinants of the savings and credit indexes
for households with workers with benefits

	SAVING INDEX					CREDIT INDEX			
	Grouped Data	ENIF 2012	ENIF 2015	ENIF 2018		Grouped Data	ENIF 2012	ENIF 2015	ENIF 2018
Variable	Coef.	Coef.	Coef.	Coef.	Variable	Coef.	Coef.	Coef.	Coef.
d2015	-0.048				d2015	0.205 *			
	(0.093)					(0.120)			
d2018	0.067				d2018	0.208 *			
	(0.108)					(0.116)			
woman	-0.046	-0.136	-0.004	-0.033	woman	-0.008	-0.061	0.106	-0.012
	(0.050)	(0.113)	(0.113)	(0.068)		(0.064)	(0.140)	(0.142)	(0.079)
age	0.002	0.004	-0.014	0.002	age	-0.003	-0.005	0.060 *	-0.005
	(0.005)	(0.009)	(0.027)	(0.005)		(0.006)	(0.011)	(0.037)	(0.006)
age2	0.000	0.000	0.000	0.000	age2	0.000	0.000	-0.001 *	0.000
	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)
hsize	0.005	0.019	0.018	-0.010	hsize	0.012	0.010	0.039	-0.008
	(0.013)	(0.028)	(0.025)	(0.019)		(0.017)	(0.035)	(0.031)	(0.022)
hheads	-0.129 **	-0.238 **	0.005	-0.096	hheads	0.015	-0.008	0.106	0.009
	(0.051)	(0.114)	(0.117)	(0.070)		(0.036)	(0.143)	(0.146)	(0.035)
mofu	-0.011	-0.081	-0.027	-0.063	mofu	-0.034	0.151	0.025	-0.040
	(0.017)	(0.115)	(0.107)	(0.070)		(0.022)	(0.146)	(0.134)	(0.021)
edlevel	0.203 ***	0.321 **	0.022	0.200 **	edlevel	0.193 **	0.260	0.156	0.000
	(0.064)	(0.145)	(0.127)	(0.090)		(0.079)	(0.158)	(0.158)	(0.002)
edlevel2	-0.018 ***	-0.030 **	0.000	-0.018 **	edlevel2	-0.019 **	-0.026	-0.018	0.000
	(0.006)	(0.014)	(0.012)	(0.009)		(0.008)	(0.017)	(0.015)	(omitted)
wrem	0.03480	-0.09062			wrem	-0.06868	0.19203		
	(0.18112)	(0.17756)				(0.23205)	(0.21255)		
hws	2.438 ***	0.619 ***	18.384	29.881	hws	0.238 ***	-0.103	0.309 **	0.337 ***
	(0.095)	(0.126)	(330.049)	(241.402)		(0.073)	(0.151)	(0.147)	(0.096)
crshock	0.147	0.542 ***	0.206	0.000	crshock	-0.220 *	-0.319 **	0.587 *	0.000
	(0.110)	(0.120)	(0.308)	(omitted)		(0.126)	(0.157)	(0.343)	(omitted)
locsize	-0.025	-0.038	-0.050	0.014	locsize	-0.038	-0.089	-0.005	-0.053
	(0.055)	(0.115)	(0.115)	(0.078)		(0.070)	(0.144)	(0.142)	(0.091)
labincom	0.390 ***	0.934 *	0.344	0.284 *	labincom	0.626 ***	0.548	0.607	0.592 ***
	(0.131)	(0.538)	(0.383)	(0.150)		(0.182)	(0.558)	(0.469)	(0.200)
numbb	0.000 *	0.000	0.000	0.000	numbb	0.000 **	-0.001	0.000	0.000
	(0.000)	(0.001)	(0.001)	(0.000)		(0.000)	(0.001)	(0.001)	(0.000)
numbc	0.000	0.000	0.000	0.000	numbc	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)
_cons	-4.255 ***	-3.651 ***	-19.419	-31.219	_cons	-3.145 ***	-3.001 ***	-4.913 ***	-2.750 ***
	(0.236)	(0.663)	(330.050)	(241.402)		(0.285)	(0.719)	(0.939)	(0.267)
Deviation	1848.919	643.221	215.027	593.526	Deviation	2314.796	538.301	570.282	1177.521
(1/df) Deviation	0.169	0.259	0.077	0.105	(1/df) Deviation	0.211	0.217	0.205	0.208
Pearson	2434.069	624.020	208.259	563.196	Pearson	2301.782	571.438	560.482	1158.271
(1/df) Pearson	0.222	0.252	0.075	0.100	(1/df) Pearson	0.210	0.231	0.201	0.205
AIC	0.654	0.655	0.590	0.626	AIC	0.509	0.494	0.522	0.513
Log likelihood	-3568.771	-801.277	-810.824	-1758.098	Log likelihood	-2770.471	-600.242	-716.071	-1439.813
BIC	-99973.850	-18747.630	-21918.350	-48233.130	BIC	-99507.970	-18852.550	-21563.100	-47686.690
No of Observ	10963	2495	2804	5664	No of Observ	10963	2495	2804	5667
Residual df	10946	2479	2788	5650	Residual df	10946	2479	2788	5654

Notes: asterics denote significance level *0.10, **0.05 y ***0.01 The standar errors are shown in parethesis
hsize= householdsize, hheads= household heads, mofu= married or free union, edlevel= educational level, wrem= with remittances, hws= household with savings, crshock= capacity response to shocks
locsize= location size, labincom= with labor income, numbb= number of bank branches, numbc= number of bank correspondents, _cons= constant

113

Table 10
Determinants of the financial inclusion indexes
for households with workers with benefits

	AGGREGATE INDEX			
	Grouped Data		**ENIF 2012**	**ENIF 2015**	**ENIF 2018**
Variable	*Coef.*	*Coef.*	*Coef.*	*Coef.*
d2015	0.053			
	(0.103)			
d2018	0.154			
	(0.120)			
woman	-0.028	-0.101	0.041	-0.018
	(0.055)	(0.124)	(0.123)	(0.060)
age	0.000	0.000	0.016	-0.001
	(0.005)	(0.010)	(0.030)	(0.005)
age2	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
hsize	0.007	0.014	0.026	-0.007
	(0.014)	(0.031)	(0.027)	(0.017)
hheads	-0.065	-0.133	0.046	-0.052
	(0.056)	(0.126)	(0.127)	(0.076)
mofu	-0.019	0.017	-0.004	-0.019
	(0.019)	(0.128)	(0.116)	(0.016)
edlevel	0.187 ***	0.282 *	0.069	0.174 *
	(0.070)	(0.155)	(0.137)	(0.097)
edlevel2	-0.017 ***	-0.027 *	-0.007	-0.016 *
	(0.007)	(0.015)	(0.013)	(0.009)
wrem		-0.01120	0.03129	
		(0.20118)	(0.19053)	
hws	1.254 ***	0.289 **	1.629 ***	1.569 ***
	(0.076)	(0.135)	(0.176)	(0.120)
crshock	-0.026	0.177	0.383	0.000
	(0.115)	(0.133)	(0.315)	(omitted)
locsize	-0.029	-0.058	-0.032	-0.016
	(0.060)	(0.127)	(0.124)	(0.069)
labincom	0.466 ***	0.731	0.462	0.346 **
	(0.149)	(0.547)	(0.410)	(0.146)
numbb	0.000 *	0.000	0.000	0.000
	(0.000)	(0.001)	(0.001)	(0.000)
numbc	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
_cons	-3.499 ***	-3.302 ***	-4.189 ***	-3.379 ***
	(0.248)	(0.685)	(0.806)	(0.220)
Deviation	1192.018	362.678	230.503	516.649
(1/df) Deviation	0.109	0.146	0.083	0.091
Pearson	1198.341	339.049	236.951	535.406
(1/df) Pearson	0.109	0.137	0.085	0.095
AIC	0.586	0.563	0.581	0.595
Log likelihood	-3197.851	-686.962	-798.927	-1671.537
BIC	-100630.800	-19028.170	-21902.880	-48347.570
No of Observ	10963	2495	2804	5667
Residual df	10946	2479	2788	5654

Notes: asterics denote significance level *0.10, **0.05 y ***0.01 The standar errors are shown in parethesis
hsize= householdsize, hheads= household heads, mofu= married or free union, edlevel= educational level,
wrem= with remittances, hws= household with savings, crshock= capacity response to shocks, locsize=
location size, labincom= with labor income, numbb= number of bank branches, numbc= number of bank
correspondents, _cons= constant

Table 11
Determinants of the savings and credit indexes for households with workers without benefits

SAVING INDEX

Variable	Grouped Data Coef.	ENIF 2012 Coef.	ENIF 2015 Coef.	ENIF 2018 Coef.
d2015	-0.280 **			
	(0.137)			
d2018	-0.257 **			
	(0.129)			
woman	0.047	0.044	0.057	-0.016
	(0.072)	(0.155)	(0.167)	(0.098)
age	-0.002	0.005	-0.011	-0.004
	(0.006)	(0.012)	(0.038)	(0.007)
age2	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
hsize	0.002	0.010	-0.006	0.004
	(0.019)	(0.038)	(0.038)	(0.027)
hhead	-0.193 ***	-0.306	0.149	-0.191 *
	(0.073)	(0.158)	(0.189)	(0.099)
mofu	-0.002	-0.084	-0.025	-0.072
	(0.025)	(0.162)	(0.164)	(0.103)
edlevel	0.195 **	0.220 *	0.155	0.172 *
	(0.072)	(0.151)	(0.147)	(0.102)
edlevel2	-0.017 **	-0.019	-0.014	-0.014
	(0.008)	(0.016)	(0.016)	(0.011)
wrem	0.10980	0.06485		
	(0.22882)	(0.24249)		
hws	2.370 ***	0.309 *	1.549 ***	28.589
	(0.116)	(0.176)	(0.219)	(287.837)
crshock	0.301 **	0.370 **	0.366	0.000
	(0.150)	(0.176)	(0.375)	(omitted)
locsize	-0.103	-0.052	-0.134	-0.066
	(0.077)	(0.157)	(0.168)	(0.112)
labincom	0.171 **	0.542 *	0.136	0.134
	(0.096)	(0.297)	(0.195)	(0.124)
numbb	0.000	0.001	-0.001	0.000
	(0.000)	(0.001)	(0.001)	(0.000)
numbc	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
_cons	-3.980 ***	-3.427 ***	-3.773 ***	-29.869
	(0.247)	(0.489)	(0.977)	(287.837)
Deviation	1010.757	386.374	105.202	293.738
(1/df) Deviation	0.151	0.213	0.068	0.089
Pearson	1346.745	406.594	99.766	273.056
(1/df) Pearson	0.201	0.224	0.064	0.083
AIC	0.551	0.521	0.501	0.541
Log likelihood	-1836.714	-460.844	-377.918	-885.230
BIC	-58110.790	-13232.020	-11363.820	-26528.590
No of Observ	6725	1829	1574	3322
Residual df	6708	1813	1558	3308

CREDIT INDEX

Variable	Grouped Data Coef.	ENIF 2012 Coef.	ENIF 2015 Coef.	ENIF 2018 Coef.
d2015	0.022			
	(0.160)			
d2018	0.193			
	(0.185)			
woman	0.136	0.226	0.179	0.051
	(0.084)	(0.167)	(0.196)	(0.104)
age	0.001	0.002	0.027	-0.001
	(0.007)	(0.013)	(0.045)	(0.008)
age2	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.001)	(0.000)
hsize	0.021	0.024	0.000	0.026
	(0.021)	(0.040)	(0.043)	(0.028)
hheads	-0.019	-0.134	0.121	-0.013
	(0.086)	(0.170)	(0.208)	(0.120)
mofu	-0.050	0.258	-0.033	-0.058
	(0.030)	(0.183)	(0.189)	(0.027)
edlevel	0.271 ***	0.330 **	0.105	0.293 **
	(0.084)	(0.163)	(0.176)	(0.122)
edlevel2	-0.027 ***	-0.032 *	-0.011	-0.030 **
	(0.009)	(0.018)	(0.019)	(0.013)
wrem	0.10555	0.31608		
	(0.24599)	(0.26103)		
hws	0.232 **	-0.114	0.295	0.349 ***
	(0.091)	(0.195)	(0.187)	(0.118)
crshock	0.024	-0.037	0.509	0.000
	(0.159)	(0.196)	(0.396)	(omitted)
locsize	0.038	0.103	-0.030	0.007
	(0.088)	(0.167)	(0.194)	(0.118)
labincom	0.354 ***	0.617 *	0.229	0.313 **
	(0.120)	(0.341)	(0.232)	(0.143)
numbb	0.000	0.000	0.000	0.000
	(0.000)	(0.001)	(0.001)	(0.000)
numbc	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
_cons	-3.257 ***	-3.661 ***	-3.631 ***	-2.744 ***
	(0.264)	(0.536)	(1.075)	(0.278)
Deviation	1366.989	363.532	311.810	677.677
(1/df) Deviation	0.204	0.201	0.200	0.205
Pearson	1362.278	375.129	312.122	661.896
(1/df) Pearson	0.203	0.207	0.200	0.200
AIC	0.496	0.485	0.505	0.509
Log likelihood	-1649.225	-427.220	-381.531	-833.488
BIC	-57754.550	-13254.860	-11157.210	-26170.970
No of Observ	6725	1829	1574	3324
Residual df	6708	1813	1558	3311

Notes: asterics denote significance level *0.10, **0.05 y ***0.01 The standar errors are shown in parethesis

hsize= householdsize, hheads= household heads, mofu= married or free union, edlevel= educational level, wrem= with remittances, hws= household with savings, crshock= capacity response to shocks

locsize= location size, labincom= with labor income, numbb= number of bank branches, numbc= number of bank correspondents, _cons= constant

Table 12
Determinants of the financial inclusion indexes
for households with workers without benefits

	AGGREGATE INDEX			
	Grouped Data		ENIF 2012	ENIF 2015	ENIF 2018
Variable	Coef.	Coef.	Coef.	Coef.
d2015	-0.137			
	(0.145)			
d2018	-0.088			
	(0.168)			
woman	0.085	0.133	0.113	0.015
	(0.076)	(0.159)	(0.177)	(0.086)
age	0.000	0.004	0.007	-0.002
	(0.007)	(0.012)	(0.040)	(0.007)
age2	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
hsize	0.011	0.016	-0.002	0.012
	(0.020)	(0.039)	(0.039)	(0.024)
hheads	-0.108	-0.213	0.015	-0.105
	(0.078)	(0.163)	(0.189)	(0.039)
mofu	-0.023	0.083	-0.030	-0.028
	(0.027)	(0.170)	(0.172)	(0.023)
edlevel	0.222 ***	0.268 *	0.128	0.217 **
	(0.077)	(0.156)	(0.158)	(0.109)
edlevel2	-0.021 ***	-0.025	-0.012	-0.021 *
	(0.008)	(0.017)	(0.017)	(0.011)
wrem		0.10621	0.18326	
		(0.23548)	(0.24821)	
hws	1.181 ***	0.309 *	1.549 ***	1.462 ***
	(0.093)	(0.176)	(0.219)	(0.145)
crshock	0.163	0.370 **	0.366	0.000
	(0.151)	(0.176)	(0.375)	(omitted)
locsize	-0.033	0.029	-0.084	-0.033
	(0.081)	(0.160)	(0.177)	(0.099)
labincom	0.246 **	0.565 *	0.175	0.221 *
	(0.105)	(0.315)	(0.208)	(0.135)
numbb	0.000	0.001	0.000	0.000
	(0.000)	(0.001)	(0.001)	(0.000)
numbc	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
_cons	-3.417 ***	-3.496 ***	-3.773 ***	-3.327 ***
	(0.247)	(0.507)	(0.977)	(0.253)
Deviation	712.684	232.097	132.763	304.512
(1/df) Deviation	0.106	0.128	0.085	0.092
Pearson	713.918	221.879	136.870	305.163
(1/df) Pearson	0.106	0.122	0.088	0.092
AIC	0.527	0.495	0.528	0.548
Log likelihood	-1755.382	-436.292	-399.483	-898.395
BIC	-58408.860	-13386.300	-11336.260	-26544.140
No of Observ	6725	1829	1574	3324
Residual df	6708	1813	1558	3311

Notes: asterics denote significance level *0.10, **0.05 y ***0.01 The standar errors are shown in parethesis hsize= householdsize, hheads= household heads, mofu= married or free union, edlevel= educational level, wrem= with remittances, hws= household with savings, crshock= capacity response to shocks, locsize= location size, labincom= with labor income, numbb= number of bank branches, numbc= number of bank correspondents, _cons= constant

Tables 11 and 12 show similar patterns regarding savings, credit and financial inclusion among the households with workers without benefits. The most important determinants of the main indexes are the level of education (edlevel, edlevel2), the availability of savings (hws) and the existence of labor income (labinc). Again, the regressions suggest that the level of education has a positive, but nonlinear, relationship with the indexes. The estimations also suggest that the access and use of savings decreased in time and that the constant is negative. Again, the estimations do not show that women have advantages with respect to men regarding savings, credit nor financial inclusion.

We can summarize our findings by indicating that they confirm that the determinants of savings, credit and financial inclusion are similar among Mexican households with workers with and without benefits. In both types of households, the most important determinants of the main indexes are the level of education, the availability of savings and the existence of labor income. The regressions suggest that the level of education has a positive, but nonlinear, relationship with the main indexes. The estimations also suggest that the access and use of savings decreased in time for households with workers without benefits; but also that the access and use of credit increased in time for households with workers with benefits. The findings also show that the constant is negative. Furthermore, the estimations do not show that women have any advantages with respect to men regarding savings, credit nor financial inclusion.

Conclusions

In this study we have studied the savings, credit and financial inclusion determinants of Mexican households using supply-side, demand-side and socioeconomic determinants of the access and use of savings and credit products available in the informal financial system. Particularly, assuming that financial inclusion depends on income and employment statuses, we have focused on households with workers with labor benefits and on households with workers without benefits. The study has relied on descriptive statistics and regressions based on the logit and GLM

techniques. We have used micro data from the ENIF surveys for the years 2012, 2015 and 2018.

We summarize our findings regarding the analysis of the descriptive statistics by indicating that the access and use of informal financial products have been similar among Mexican households. In both types of households, the savings and the credit indexes have risen during the analyzed period and the savings indexes have been higher than the credit ones. The most popular savings products have been saving money at home and saving in a ROSCA. The most popular credit products have been borrowing money from relatives and borrowing money from friends and colleagues. However, households with workers with benefits have had a higher level of financial inclusion than households with workers without benefits.

We summarize our findings regarding the logit models by indicating that the most important determinants to the access and use of savings and credit products are the level of education, the availability of savings and the existence of labor income. The findings suggest that the level of education has had a positive, but nonlinear, relationship with financial inclusion. The estimations also suggest that the access and use of informal financial products has changed in time. Interestingly, the findings show that women in households without benefits have had some advantages with respect to men regarding the use and access of banking and pawn-shop credit services.

We summarize our findings regarding the GLM models by indicating that they confirm that the determinants of savings, credit and financial inclusion are similar among Mexican households with workers with and without benefits. In both types of households, the most important determinants of the main indexes are the level of education, the availability of savings and the existence of labor income. The regressions suggest that the level of education has a positive, but nonlinear, relationship with the main indexes. The estimations also suggest that the access and use of savings decreased in time for households with workers without benefits; but also that the access and use of credit increased in time for households with workers with benefits. The findings also show that the constant is negative. Furthermore, the estimations do not show that women have any

advantages with respect to men regarding savings, credit nor financial inclusion.

We should point out that our findings complement and confirm the findings of other studies. Particularly, they confirm the findings of Cámara and Tuesta (2015), Pavon (2016) and Martínez-Carrasco et. al., (2016) regarding labor formality, education and demand-side determinants. They also complement the findings of Mansell (1995) regarding savings and credit of poor Mexican people. Furthermore, they validate the findings of Banerjee et al. (2015) regarding the importance of education and gender in financial inclusion.

Finally, we should point out that our findings have public policy implications. Particularly, they imply that financial inclusion policies should focus on promoting education and labor conditions (demand-side determinants). They also imply that it is necessary to promote credit products. Furthermore, given that our findings provide little evidence that women have advantages with respect to men regarding savings, credit or financial inclusion, gender-oriented policies might be questionable. Thus, we believe that our findings may be interesting for academics, practitioners and policy-makers alike.

References

Banerjee, A., Duflo, E., Glennerster, R., & Kinnan, C. (2015). The miracle of microfinance? Evidence from a randomized evaluation. *American Economic Journal: Applied Economics*, 7(1), 22-53.

Cámara, N. & Tuesta, D. (2015). Factors that matter for financial inclusion: evidence from Peru. *Aestimatio, The IEB International Journal of Finance*, 10(1), 10-31.

CONAIF (2016). *Política Nacional de Inclusión Financiera*, México D.F.: Consejo Nacional de Inclusión Financiera.

Cull, R., Ehrbeck, T., & Holle, N. (2014). La inclusión financiera y el desarrollo: Pruebas recientes de su impacto. *Enfoques*, (92), 1-11.

Mansell, C. (1995). *Las Finanzas Populares en México. El Redescubrimiento de un Sistema Financiero Olvidado*, México D.F.: Editorial Milenio e ITAM.

Martínez-Carrasco Pleite, F., Muñoz Soriano, A. M., Eid, M., & Colino Sueiras, J. (2016). Inclusión financiera en el ámbito rural mediante cajas de ahorro. Estudio de una experiencia en México. *Perfiles Latinoamericanos*, 24(48), 185-211.

Mohseni-Cheraghlou, A. (2017). Financial inclusion and poverty alleviation in muslim-majority countries: the role of Islamic finance and Qard Hassan. En *Financial Inclusion and Poverty Alleviation* (pp. 141-197). Cham: Palgrave Macmillan.

Morduch, J., & Armendariz, B. (2005). *The Economics of Microfinance,* Cambridge: MIT Press.

ENIF. National Financial Inclusion Survey 2012. Available in: http://www.beta.inegi.org.mx/proyectos/enchogares/especiales/enif/2012/

ENIF. National Financial Inclusion Survey 2015. Available in: http://www.beta.inegi.org.mx/proyectos/enchogares/especiales/enif/2015/

ENIF. National Financial Inclusion Survey 2018. Available in: http://www.beta.inegi.org.mx/programas/enif/2018/

Pavón, L. (2016). *Inclusión Financiera de las PYMES en el Ecuador y México,* Santiago: Comisión Económica para América Latina y el Caribe.

Raccanello, K., & Herrera-Guzmán, E. (2014). Educación e inclusión financiera. *Revista Latinoamericana de Estudios Educativos (México)*, 44(2), 119-141.

Villacorta, O., & Reyes, J. D. (2012). Servicios financieros para las mayorías. La inclusión financiera en México. *Revista de Microfinanzas y Banca Social (MBS)*, (2), 5-21.

Contributors

MOISÉS ALEJANDRO ALARCÓN OSUNA

Dr. Alarcón-Osuna is Professor in the Department of Regional Studies (known in Spanish as DEC-INESER) and coordinator of the B.A. in Economics Program at the University of Guadalajara. He has a Ph.D. in Economic and Administrative Sciences from the same institution. He is also a member of the Mexican System of Researchers (Level I). He participates in the PLEJ Research Group on "Comparative Economic Policy Analysis" and is member of the faculty of the Ph.D. in Economic Studies Program of the University of Guadalajara. His research topics refer to Business Economics and the Economics of Technological Change. Email: moises.alarcon@cucea.udg.mx

DAMARA SEMIRAIS ALVAREZ GONZALEZ

Damara Semirais Álvarez-Gonzalez is studying in the Ph.D. in Economic Studies Program at the University of Guadalajara. She has a M.Sc. in Business and Economic Studies from the same institution. She has received grants to support her research activities by the Mexican Council of Science and Technology (known in Spanish as CONACYT). She has also been an evaluator of the Mexican Council for the Certification of Economics (known as CONACE). She participates in the Economic Theory Research Centre (known as CITEC) of the University of Guadalajara. Her research topics refer to Financial Intermediation Economics, Development Economics and Microfinance. Email: damara027@gmail.com

JAVIER EMMANUEL ANGUIANO PITA

Javier Emmanuel Anguiano-Pita is studying in the Ph.D. in Economic Studies Program at the University of Guadalajara. He has a M.Sc. in Economics from the same institution. He has received grants to support research activities and to develop his postgraduate studies. He also participates in the PLEJ Research Group on "Comparative Economic Policy Analysis" of the University of Guadalajara. His research topics refer to Finance, Risk and Econophysics; International Economics; and Regional and Macroeconomic Performance. Email: je.ptt@hotmail.com

OSCAR YAHEVH CARRERA MORA

Dr. Carrera-Mora is Professor in the Faculty of Business and Technology of Veracruz University. He has a Ph.D. in Administrative Sciences and Development Management from the same institution. He is also a member of the Mexican System of Researchers (Level C) and it is included in the Census of Veracruz´ State Researchers. His research topics refer to E-government Issues; Computational Management; and Economic Systems. Email: ocarrera@uv.mx

EVANGELINA CRUZ BARBA

Dr. Cruz-Barba is Professor in the Department of Law and Social Sciences of the University of Guadalajara. She has a Ph.D. in Education and a M.Sc. in Business and Economic Studies from the same institution. She is also a member of the Mexican System of Researchers (Level I). She participates in the Mexican Interinstitutional Committee for the Evaluation of Higher Education (known in Spanish as CIIES) and is member of the faculty of the Ph.D. in Economic Studies Program of the University of Guadalajara. Her research topics refer to Tourism Economics and Economics of Education. Email: cbe04843@cucea.udg.mx

RAFAEL SALVADOR ESPINOSA RAMIREZ

Dr. Espinosa-Ramirez is Professor in the Department of Economics of the University of Guadalajara. He has a Ph.D. in Economics from the University of Essex (United Kingdom). He is also a member of the Mexican

System of Researchers (Level II). He participates in the PLEJ Research Group on "Comparative Economic Policy Analysis" and is member of the faculty of the Ph.D. in Economic Studies Program of the University of Guadalajara. His research topics refer to Crime Economics; International Economics; Political Economy and Public Economics; and Institutional Economics. Email: rafaelsa@cucea.udg.mx

CARLOS FONG REYNOSO

Dr. Fong-Reynoso is Professor in the Department of Regional Studies (known in Spanish as DEC-INESER) of the University of Guadalajara. He has a Ph.D. in Economics, Management, and Organization from the Autonomous University of Barcelona (Spain). He is also a member of the Mexican System of Researchers (Level I). He is member of the faculty of the Ph.D. in Economic Studies Program of the University of Guadalajara. His research topics include His research refer to Business Economics; SME´s; Entrepreneurship; and Managerial Economics. Email: cfong@cucea.udg.mx

LUIS ERNESTO OCAMPO FIGUEROA

Dr. Ocampo-Figueroa is Professor in the Department of Regional Studies (known in Spanish as DEC-INESER) and coordinator of the M.Sc. Program in Business and Economic Studies at the University of Guadalajara. He has a Ph.D. in Economic and Administrative Sciences from the same institution. He is member of the faculty of the M.B.A. Program of the University of Guadalajara. His research topics refer to Business Economics; SME´s; Entrepreneurship; and Managerial Economics. Email: : ocampo.f@cucea.udg.mx

MARIA CATALINA OVANDO CHICO

Dr. Ovando-Chico is Head of the Information and Communications Technologies Unit in the Mexican Ministry of Communications and Transportation (known in Spanish as SCT). She has a Ph.D. in Telecommunication Sciences from the Polytechnic University of Madrid (Spain). She is also a member of the Mexican System of Researchers (Level I). She participates

is member of the faculty of the Graduate School of the State of Puebla Popular Autonomous University (known in Spanish as UPAEP). Her research topics refer to Internet Economics; Telecommunications; and Applied Quantitative Methods. Email: mariacatalina.ovando@upaep.mx

ANTONIO RUIZ PORRAS

Dr. Ruiz-Porras is Professor in the Department of Quantitative Methods and coordinator of the Ph.D. in Economic Studies Program at the University of Guadalajara. He has a Ph.D. in Economics from the University of Nottingham (United Kingdom). He is also a member of the Mexican System of Researchers (Level II) and of the Mexican Academy of Sciences. He is the Director of the Research Center in Economic Theory (known as CITEC) and the Head of the PLEJ Research Group on "Comparative Economic Policy Analysis" of the University of Guadalajara. His research topics refer to Finance, Risk and Econophysics; Crime Economics; International Economics; Poverty, Labor Market and Income Distribution; Regional and Macroeconomic Performance; Political Economy and Public Economics; Evaluation of Social Programs. Email: antoniop@cucea.udg.mx

SALVADOR SANDOVAL BRAVO

Dr. Sandoval-Bravo is Professor in the Department of Quantitative Methods at the University of Guadalajara. He has a Ph.D. in Business and Economic Studies from the same institution. He is also a member of the Mexican System of Researchers (Level I). He participates in the Economic Theory Research Centre (known as CITEC) and is member of the faculty of the Ph.D. in Economic Studies Program of the University of Guadalajara. His research topics refer to Environmental Economics; International Economics; Political Economy and Public Economics; and Institutional Economics. Email: salvador.sandoval@academicos.udg.mx

Traditionally, the development of the economic science and the economic policy has depended on specific concerns. Particularly, since the outburst of sanitary and economic crises of 2020, it has been recognized the necessity of promoting the recovery and development of the economies worldwide. In this book, "Rebuilding the economy: Economic policies for recovery and development", we include five studies written by Mexican scholars. The common denominator of the such studies is that all of them recommend specific policies based on the results supported by contemporary statistical techniques and/or by formal theoretical models.

We hope that academics, students and policy-makers will find the book useful for understanding and promoting policies useful to encourage the recovery and development of the Mexican economy.

DEEC | DOCTORADO EN ESTUDIOS ECONÓMICOS

C.I.T.E.C
Centro de Investigación de Teoría Económica

DES

Plataforma Economía de Jalisco
Hacia la recuperación