

## **The persuasive role of information: the case of EITC reminding letters**

By Michel Strawczynski and Natalia Mironychev<sup>1</sup>

October 2013

### **ABSTRACT**

This paper uses data on Earned Income Tax Credit (EITC) reminding letters sent by the Israel Tax Authority to potentially eligible applicants during the period 2008-2011. Using a setup of repeated letters sent to the applicants, we are able to identify whether individuals apply for receiving the EITC as a reaction to the reminding letter. In the framework of a dynamic analysis of learning, we estimate the persuasive role of information at 1.5 percent. Using independently performed questionnaires, we are also able to characterize the "letter dependent" population, defined as the applicants that depend on receiving letters for requiring the EITC transfer. We found that these applicants are older, they receive a lower transfer, they have a fair knowledge about the program, and they do not actively seek for information on the expected EITC transfer amount. We also found that they have particular cultural characteristics: the representation of ultraorthodox applicants is higher than their percent in the population, they have problems with fluency in languages including Hebrew and the percent of households with two earners is low.

**Key Words:** EITC, Reminding letters, Information.

**JEL Classification Numbers:** H53, H83.

---

<sup>1</sup> The Hebrew University of Jerusalem, Dept. of Economics and School of Public Policy, and the Israel Tax Authority, respectively. We are thankful to the participants at the Public Policy School Seminar at the Hebrew University and to members of the Official EITC Research Group for helpful remarks.

## 1. Introduction

A well-known feature of transfers to the socially disadvantaged is that many targeted individuals fail to receive their benefits (Curie, 2006). The Earned Income Tax Credit (EITC) in the US at its initial implementation stage, and the newly introduced EITC system in Israel, are good examples for this feature, with estimated incomplete take-up rates of 30 and 50 percent, respectively.<sup>2</sup>

Several explanations are generally cited for incomplete take-up (Curie, 2006): lack of information, stigma, transaction costs and complexity. The inability of differentiating among different explanations, make it difficult to quantify the importance of each of these factors. In the present paper we benefit from a unique database of EITC reminding letters in Israel, which allows us to keep track of individual's behavior in four consecutive years in which they received letters and had the opportunity to decide whether to apply or not for eligibility. Since these letters are sent directly by the Tax Authority, who is the institution that runs the EITC in Israel, the uncertainty about eligibility is relatively low, constituting a clear incentive for applying.

Bhargava and Manoli (2011) performed an experiment in collaboration with the US IRS and showed that the mere receipt of a mailing increased residual take-up by 0.14 as compared to a 0.41 initial response. Since the second mail is a reminder of the original letter sent by the IRS, this experiment implies that the mere receipt of a reminder acts as a persuasive device for these individuals. In the present paper the reminding letters database of the Tax Authority in Israel allows us to check the subsequent impact of four reminders of this type – based on annual letters sent to eligible recipients during the first four years of program implementation. By using a model of learning, we are able to differentiate between individuals that wait for the letters in order to apply and those that do not – and thus, we are able to produce an estimate of the persuasive role of the information.

Estimating the persuasive role of information is an important task, since it ultimately quantifies the contribution of letters to increasing the take-up, as opposed to its informational content – which of course is important, but it can be done by other policy

---

<sup>2</sup> In the US participation is documented in Hotz and Scholz (2003), Blumenthal, Erard and Ho (2005) and Plueger (2009). The take-up rate gradually increased from 30 percent in the first five years of implementation to 75 percent, as the amounts received climbed to the actual level of 45 percent of the wage. In Israel it was documented by the EITC Research Group (in Hebrew).

tools – like media propaganda. Differentiating among the effectiveness of policy tools is an important contribution for facilitating a cost-benefit analysis to policy makers.<sup>3</sup>

The difference between the informative content and the persuasive content of devices has been extensively analyzed and discussed in the area of marketing, as explained by Leffler (1981), Hurwitz and Caves (1988) and Narayanan, Manchanda and Chintagunta (2003). In particular, the important role of persuasion for helping the poor is emphasized by Bertrand, Mullainathan and Shafir (2006). The effectiveness of reminders is stressed by Karlan, McConnell, Mullainathan and Zinman (2010).

The paper is organized as follows: in Section 2 we provide a short literature survey on the importance of letters and information on the take up rate, and we give a general explanation about the EITC in Israel and a description of the timeline and content of the letters sent to potential participants; in Section 3 we show the impact of the letters on claims and analyze the learning pattern of individuals. In Section 4 we produce an estimate of the impact of reminding letters on the take-up rate. Finally, we summarize and conclude in Section 5.

## **2. The EITC in Israel and the Reminding Letters Mechanism**

### **2.1 The EITC in Israel**

In October 2008, the Earned Income Tax Credit (EITC) Program was implemented in certain regions of Israel<sup>4</sup>, with the purpose of enhancing incentives for participation at the labor market.<sup>5</sup> The child allowances reduction applied since 2004 was actually substituted by the transfers given through the EITC system, that grew, gradually, from a pilot project in 2008-2010 to a National-wide Program since 2011, increasing participation from 65,000 to 350,000 persons.<sup>6</sup> The take-up rate of the program - which is around 50% - is gradually

---

<sup>3</sup> For example Ebenstein and Stange (2010) show that inconvenience does not constitute a substantial factor for explaining the take-up.

<sup>4</sup> The included cities/localities are (for big cities we mention in parenthesis the number of inhabitants): Jerusalem (800,000), Ashkelon, Sderot, Natzeret, Natzeret Ilit, Ein Mahal, Bakajet, Mishmarot, Ein Iron, Arara, Kfar Pines, Kfar Kara, Or Akiva, Hedera, Pardes Hana-Karkur, Natanya, Moawia, Barta and Ein Asala.

<sup>5</sup> According to the system workers that earn a monthly wage between 1,800 and 6,000 NIS may fill a form at the Post Office requesting the subsidy provided by the EITC system, which is managed by the Tax Authority in Israel. The amounts received (at time of implementation) ranged between 20 and 420 NIS per-month, according to two categories: less than 2 children (maximum amount was 300 NIS) and more than 3 children (maximum amount was 420 NIS).

<sup>6</sup> In 2010 and 2011 (based on 2009 and 2010 wages, respectively) mothers with children up to two years old received the transfer at a national basis.

increasing, and the recommendation of the Trajtenberg Committee of raising by 50% the amount transferred to working mothers since 2013 is expected to cause a further increase in the take-up rate.

The legislative process was quick and left no time for individuals to learn about the system, resulting in a relatively low initial take-up rate – a phenomenon that is quite usual at the starting point of this kind of programs.<sup>7</sup> The EITC is implemented by the Tax Authority based on incomes of the previous year.

From the very beginning the Tax Authority designed a reminding letter in four languages: Hebrew, Russian, Arab and Amharit (Ethiopian); given the flows of immigration and the permanent minorities living in Israel, these languages cover fairly well the target population. While this design assures that the language will not be an obstacle for participating in the program, there may be cultural characteristics affecting participation, as seems to be the case – given the heterogeneity of take-up rates among different groups. In fact, since the beginning of the program take-up rates are higher among ultraorthodox Jews (70 percent) compared to Arab population (40 percent) and East Jerusalem population which is also predominantly Arab (35 percent) and to the general take-up rate, which was 45 percent in the first three years and climbed to 52 percent in the fourth year of the program implementation.

In this paper we intend to assess the impact of reminding letters on the take-up rates. In a world of full information and without any cultural factors we would expect to have a full take up rate. However, it is well-known that in reality this is not the case.<sup>8</sup> Also in the U.S., the take-up rate had risen substantially from 30 percent in the eighties to 75 percent by the end of the nineties after a huge increase in the amount of the EITC. Given this phenomenon, reminding letters have a potentially high impact on the take-up rate, since they may provide a trigger to participate – a decision that would otherwise be postponed given the hard daily life of potential participants. Given the time-table for receiving the transfer, a postponement implies not receiving the credit at all, thus reducing the take-up rate. The present paper concentrates on the potential persuasive role of information: does the letter makes the difference between applying and not applying for receiving the EITC transfer?

---

<sup>7</sup> For instance that was the case in the U.S. as documented by Wiseman (2007).

<sup>8</sup> For example, in Great Britain, Storey and Chamberlin (2001) show that 11 percent of eligible parents do not claim free meals at the public system in England due to a lack of knowledge on eligibility. One third of pupils and two fifths of parents mentioned stigma and embarrassment as the main reason for not claiming eligibility.

For this purpose we use administrative data from the Tax Authority, which is the institution that runs this program. The Tax Authority receives each year computerized filings from the employers with detailed data regarding the employees' incomes. All the data from all employers, combined with additional data from another sources (National Insurance Institute, Land registry, Ministry of Interim) allow assessing at the end of the year a full picture of potential participants, according to their incomes, ages, children and ownership of assets; these attributes are needed to determine participation (see next section). These data is used by the Authority to create a list of potential participants, which is used later in the year in order to send letters to individuals in order to remind them about their right to claim the EITC. Since the reaction of applicants to this letter is very remarkable, we analyze the pattern of the claims in order to learn about the impact of the letters on the take-up rate.

## **2.2 Reminding letters Mechanism**

According to the EITC law individuals that are eligible must fill a form at the Post Office which is sent to the Tax Authority, who checks whether conditions for eligibility apply.<sup>9</sup> The law stipulated the way the EITC is paid according to the time of appliance: for those applying at the beginning of the budget year they receive the transfer in four equal payments (typically in July, October, January next year, and April), in the aim to create approximation to permanent income rather than "windfall" one; those applying in the second quarter of of the year receive the same amount but in three payments; applicants in the third quarter receive their EITC in two equal payments, and finally those applying at the end of the year receive the whole amount in one payment. If individuals do not apply until December they generally lose their right to apply (there are few exceptions).

Since the beginning of the program the Tax Authority sent reminding letters to eligible individuals. In the first year of implementation, which started in October 2008, letters were sent immediately after implementation (in November 2008). Since then, letters were sent in September, as shown in Table 1.

---

<sup>9</sup> The main two conditions at the time of implementation were: having a wage between 1,800 and 6,000 NIS (without exceeding the limit of 12,000 for a couple); having children or having an age of 55+.

**Table 1: Characteristics of the Reminding Letters**

Year of eligibility	N	Minimum	Maximum
sending_date.2007	52034	06-NOV-08	26-NOV-08
sending_date.2008	47737	02-SEP-09	06-SEP-09
sending_date.2009	78475	02-SEP-10	05-SEP-10
sending_date.2010	78894	04-SEP-11	11-SEP-11

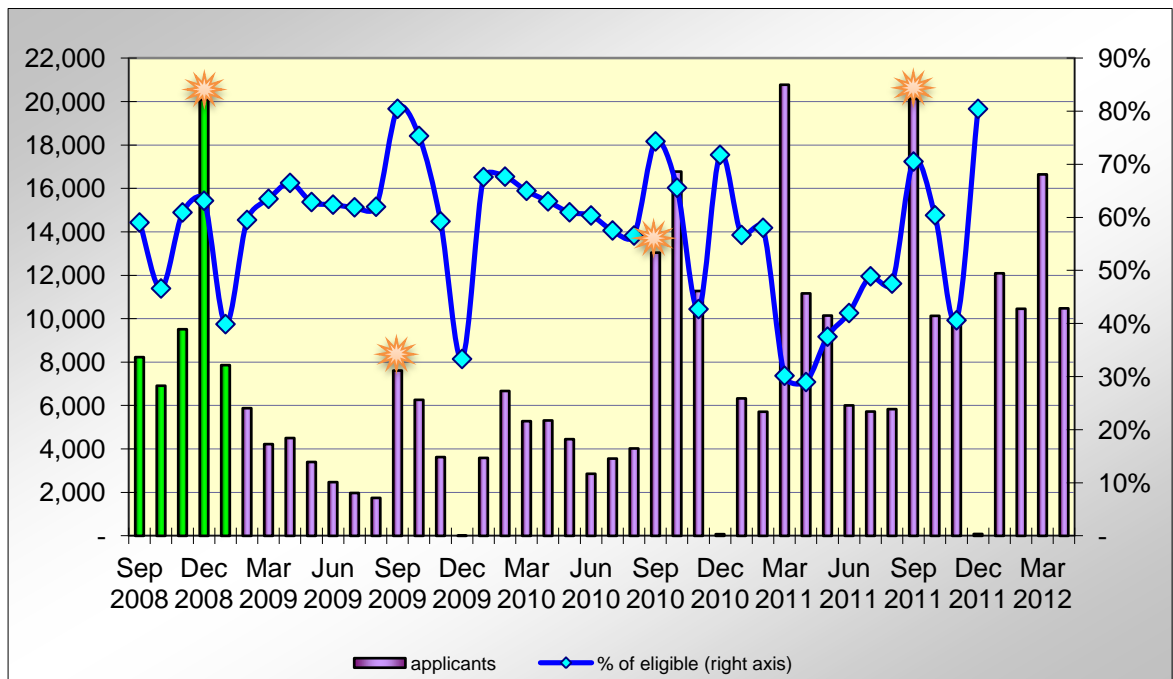
We note that the common factor of the sending date is that it was sent at the end of the eligibility period and thus potentially it constitutes both a reminding and persuasive device. The reason for choosing such a timetable is complicated: on the one side, the Tax Authority receives more accurate information as we move towards the end of the year (late filings, revised reports and so on); on the other hand, the participants should get a chance to apply by their own will, but if they fail to do so, sufficient time must be left to allow applying after receiving the letter. September seems to be optimal solution for all those aspects.

### **3 The impact of reminding letters and the learning pattern of individuals**

#### **3.1 The reminding letters and the Program Take-up**

Figure 1 shows the impact of the reminding letters on the amount of individuals applying for the EITC (reminding letters are explicitly marked above the bar of the month in which it was sent). From this figure it is evident that in September (for 2008, 2009 and 2010), after getting the letter, many individuals apply to the tax authority, causing a significant increase in the both number of applicants and the share of applicants who are actually eligible to receive EITC.

**Figure 1: Reminding Letters and applications for EITC**



Note, however, that the population applying after receiving this letter is heterogeneous: some of them are applying for the first time, some others are applying after having applied in the past and some of them were not aware about their right for applying. In order to deal with this heterogeneous population we build a framework of learning, using data on letters received during four years – from 2008 until 2011.<sup>10</sup>

The population selected for the analysis consists of applicants who are (1) eligible for EITC based on each one of the consequent income years 2007-2010; (2) actually applied for EITC in each one of the corresponding years – with or without the letter. The total amount of individuals that fulfill these conditions is 5,619.

### 3.2 A learning framework

We assume that individuals that received letters in all four years and applied to the EITC take part of a learning process that is influenced from the previous step. Thus, someone that applied for receiving the EITC after receiving a letter, can potentially learn on his eligibility and thus he may not need a letter next year. Note that for this reason it is important to look at the population is both eligible and applied, since wage earners that

<sup>10</sup> According to existing provisions this right is related to the income generated in the previous year. For example, the transfers paid in 2008 are based on income generated in 2007.

did not apply (for example, they know about themselves that they are not eligible because they are employed in shade economy, and the Tax Authority does not have the updated data on these individuals), or that applied without actually being eligible, are not necessarily part of this learning process.

Accordingly, we look at individual's behavior for applying to the EITC: did he/she apply before or after receiving the letter? When performing the analysis, we hold in mind that letters are not sent to applicants who apply on their own before the letters time. We assume that individuals that apply before receiving the letter may have learned from their experience in the past; if they apply after receiving the letter (given that they received a letter in the past), that means that learning was not strong enough or even took the undesired direction of learning *to wait* for a letter. Using this pattern of learning it is possible to build a framework of learning patterns, according to observed behavior after four years of implementation of the letters mechanism by the Tax Authority.

Table 2 shows the possible types of individuals according to their learning pattern. In this table the word "yes" means that an individual applied for the EITC *after* he/she received the letter, while the word "no" means that he did not need the letter for appliance; i.e., he/she applied for the EITC *before* receiving the letter.



**Table 2: Applying to the EITC before or after receiving the letter**

2007	2008	2009	2010	Types	
NO	NO	NO	YES	SLIGHT DISTRACTION 1 (SD1)	
		YES	NO	SLIGHT DISTRACTION 2 (SD2)	
		YES	YES	FORGOTTER (F)	
	YES	NO	NO	NO	SECOND SHOT LEARNER (SSL)
			YES	YES	FREQUENT DISTRACTION 1 (FD1)
		YES	NO	NO	FREQUENT DISTRACTION 2 (FD2)
			YES	YES	REGRESSION (R)
	YES	NO	NO	NO	FIRST SHOT LEARNER (FSL)
YES				YES	FREQUENT DISTRACTION 3 (FD3)
YES			NO	NO	FREQUENT DISTRACTION 4 (FD4)
			YES	YES	LETTER ADDICT 1 (LA1)
YES		NO	NO	NO	LATE LEARNER (LL)
			YES	YES	LETTER ADDICT 2 (LA2)
		YES	NO	NO	VERY LATE LEARNER (VLL)
			YES	YES	LETTER DEPENDENT (LD)

Individuals that needed a letter after applying without the need of receiving one are catalogued as subject to a "distraction", which can be frequent (if it happens repeatedly) or slight (if it happens only once). If they needed a letter after applying twice for the EITC before receiving a letter, they are characterized as "forgotters". Someone that did not need a letter at the first time, but he needed it always afterwards, is subject according to our analysis to a "regression". Two additional patterns can be characterized: individuals that learn, and individuals that depend on letters for applying. The individuals that learn needed a letter at an initial step, and then they continued to apply until the end of the sample without the need of a

letter; we can find first shot learners and later stage ("second stage" or "late") learners. Individuals that are dependent on letters are those that at the end of the sample still need a letter for applying, while some of them already learned to apply by themselves in the past ("letter addicts") and some did never learn to apply without a letter ("letter dependent" individuals).

### **3.3 The dynamic learning process**

The different types described above are characterized ex-ante among individuals that applied for the EITC in all four years. If learning is random, then we should not see a convergence of the different types and groups shall continue to change in substantial terms until the end of the sample.

However, if learning is not random, and individuals tend to be of a particular type from the very beginning, we should expect that at the third and fourth steps the types that are subject to the *polar learning characterizations* ("first shot learners" and "letter dependents") converge, and do not change type. In other words, if "first shot learners" are individuals that learn quickly how to apply without the need of a letter, then at the third and fourth step we shall see that only a few individuals leave this group and switch to groups characterized as "distraction". Similarly, if letter dependents do not learn at all and they depend all the time on receiving a letter, at the third and fourth step their number shall remain approximately constant, or at least may change by a relatively small dimension.

In the next section we will analyze the dynamic pattern of learning. In order to analyze whether learning is random, we will concentrate on the extreme patterns of learning – "first shot learners" and "letter dependents" – by looking whether there is convergence in the number of individuals that belongs to this type.

## **4 An estimate of the impact of reminding letters on the take-up rate: the persuasive role of information**

In this section we apply the framework shown in section 3 by looking at the population of individuals that received letters in all four years and applied for receiving the EITC – sometimes before receiving the letter and sometimes after receiving it.

## 4.1 Learning types

Table 3 shows the number of individuals of the different types. It is interesting to note that most groups are less than 5 percent of the population except for two big groups: "first shot learners" and "letter dependents". As explained above, first shot learners are individuals that in the first time applied to the EITC after receiving a letter, and since then they applied by their own; letter dependent individuals are those that in every opportunity needed a letter in order to apply. These types constitute 34.5 and 14.6 per cent of the sample, respectively.

All other groups constitute a small percentage of the total. Note that there is a small bias in the size of groups toward learning: second shot learners, late learners and very late learners constitute 5.4, 5.9 and 4.6 of total individuals, and they are among the highest size group compared to all other groups (except for slight distraction that constitutes 4.9 percent).

As a first attempt to summarize this analysis, we can say that individuals tend to learn after receiving letters, since first shot learners is the largest group compared to all other groups, and groups characterized by learning are slightly larger than groups characterized by distraction or letter addiction. This last sentence is not true for letter dependence, which turned to be a large group that merits a separate analysis. This analysis will be performed in the next sections.

In order to evaluate whether these numbers are in line with a normative distribution we look at the distribution of grades at universities. While the populations are different, it is well-known that learning is characterized by standard distributions.<sup>11</sup> Thus, we look at a parallel case: the range of grades at university, so as to learn about the normative pattern of the distribution of learning by polar sub-groups, as are the cases of FSL and LD populations in our sample. According to Bar, Kadiyali and Zussman (2009), about 40 percent of the distribution is characterized by excellence (grade A) – which would be comparable to the group FSL in our sample, that is formed by 34 percent of the population; this percent would roughly correspond to the percent presented by these authors in the period 1990-1997. The other big population presented here is the LD group, formed by 14.6 percent of the population – which roughly coincides with the 16 percent group presented by Bar, Kadiyali and Zussman (2009) for grades C-F (around

---

<sup>11</sup> Assuming that learning distributions are normal, we can use data from other cases for the purpose of a comparison aimed at characterizing different sub-populations.

the year 2000). A second relevant analysis is dynamic learning, which is characterized in the next section.

**Table 3: Different Learning types**

Type	Number	Percent
Second shot learners (SSL)	306	5.4
Late learner (LL)	331	5.9
Very late learner (VLL)	257	4.6
First shot learners (FSL)	1940	34.5
Slight distraction 1 (SD1)	275	4.9
Slight distraction 2 (SD2)	257	4.6
Forgotters (F)	228	4.1
Frequent distraction 1 (FD1)	86	1.5
Frequent distraction 2 (FD2)	149	2.7
Regression (R)	230	4.1
Frequent distraction 3 (FD3)	198	3.5
Frequent distraction 4 (FD4)	218	3.9
Letter addict 1 (LA1)	221	3.9
Letter addict 2 (LA2)	101	1.8
Letter dependent (LD)	822	14.6
Total	5619	100.0

#### **4.2 Dynamic learning**

The framework described in 3.3 allows us to analyze the dynamic pattern of learning. By looking at the difference in the number of individuals at the late steps (third and fourth step), we can see whether the number of individuals tend to converge – i.e., they are not switching to another category implying that learning is still taking place (remember that it is a cohort composed by the same individuals in all four years). If the number of individuals in the last two steps converges, this means that the learning process came to an end, and we can categorize the individuals that appear in this slot as a particular type. For example, if we look at the FSL in the third and fourth steps, a fixed number of agents

would imply that this group of individuals has learned on his right for applying to the EITC by their own, and they do not need a letter. On the other hand, if the difference between the number of individuals between the fourth and third step is high, that means that the learning process is still at place and consequently another step is needed in order to estimate the permanent amount of individuals of this type. Ideally if the difference between the number of individuals at the third and fourth step is zero, we could think of these types as reflecting the final step of the learning process.

Similarly to the previous section, we use the analysis by Bar, Kadiyali and Zussman (2009) in order to analyze normative patterns of learning. These authors show that there are two different periods for grades in their sample, which must be taken separately because of the inflation in grades. According to their methodology, we analyze separately the deviation of the two groups (that are parallel to grade A and C-F for FSL and LD respectively) during the two sub-samples (1990-97 and 1998-2004) so as to have a normative scale for judging the dynamic pattern of learning. Taking the percentages in their two different groups, we found that the deviation ranges between 7.8 and 14 percent for grade A (which corresponds to FSL), and between 19.3 and 23 percent for grades C-F (which corresponds to LD).

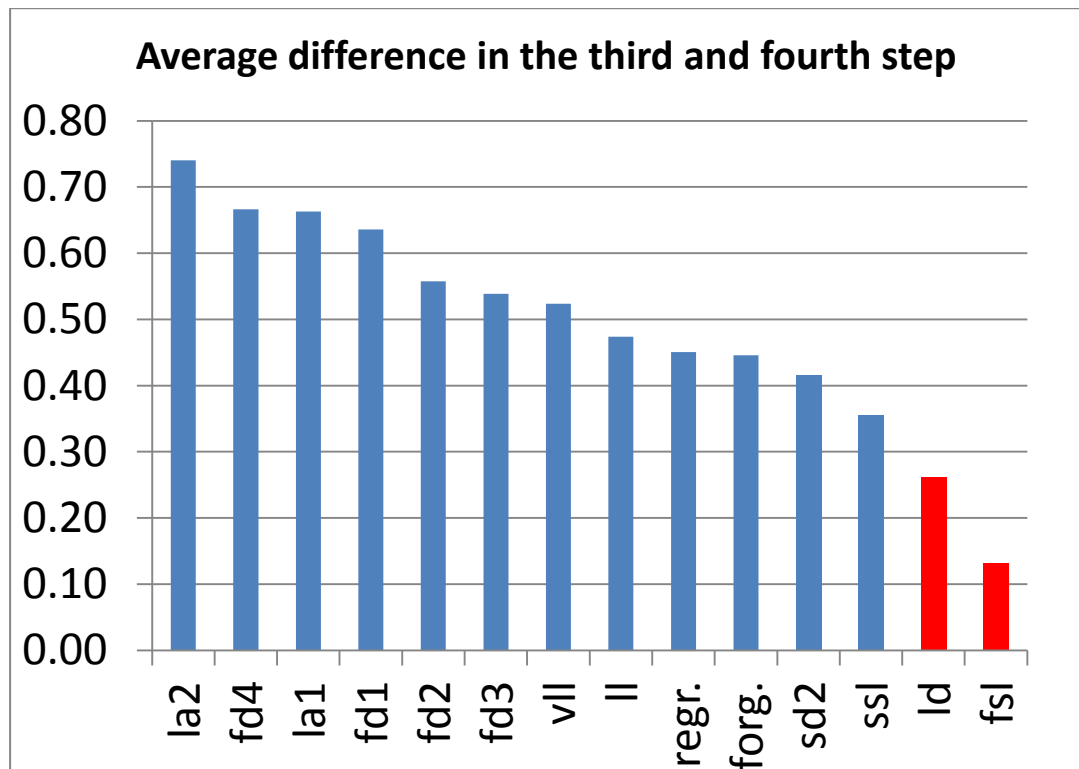
Figure 2 shows the average difference of individuals at the third and four rounds of the letters as a percent of total number of individuals in the group. This number was calculated as follows: first, we calculated the difference between the number of individuals at the third step compared to the second, and calculated the percent as a share of the individuals in the group at the second step; second, we calculated the difference between the number of individuals at the fourth step compared to the third, and calculated the percent as a share of the individuals in this group at the third step; finally we calculated the average of these two percentages.

Interestingly, two groups are clearly different compared to the others: "first shot learners" and "letter dependents". The average percentage differences of these two groups are less than 30 percent, and they are the lowest compared to all other groups. Particularly interesting is the average difference of "first shot learners", 12 percent, which although is far from zero – which would imply full convergence – but it is in the middle of the range found by Bar, Kadiyali and Zussman (2009). Concerning "letter dependents", the difference is low compared to all other groups, but it is still relatively high, 26 percent, hinting that the real number of individuals that constitute this group is

lower. Note that this percentage is similar to the highest limit found by Bar, Kadiyali and Zussman (2009) for the parallel category (grade C-F), which was 23 percent.

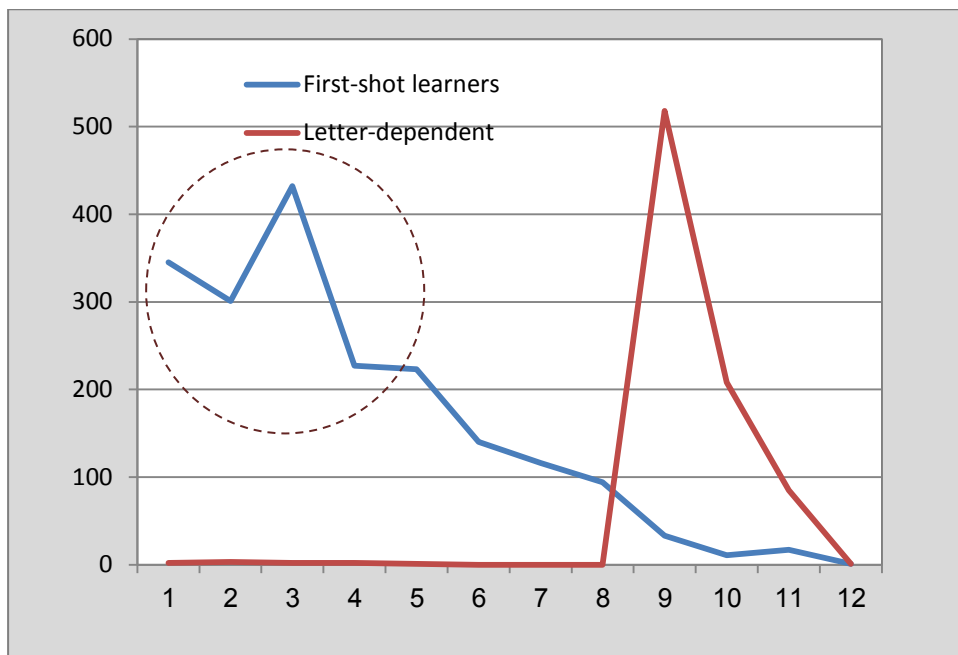
The fact that the polar groups of learning have the lowest difference among the different groups supports the conclusion that cultural patterns affect learning – causing some individuals to learn quick ("first shot learners") and some others not to learn at all ("letter dependents"). The fact that these differences are still far away from zero means that further rounds of letters would result in producing better estimates of the quantitative importance of these two groups.

**Figure 2: Average difference of the groups at the third and fourth round of letters (as a percentage of the group)**



In order to analyze "first shot learners" and "letter dependents" behavior we looked at the pattern of applications in the fourth round, i.e., at the maximum point of learning. This pattern is shown in Figure 3.

**Figure 3: The pattern of applications during the different months of the year at the fourth round of letters (2010)**



From this figure we learn that first shot learners are not affected at all by the letters. The highest number of applications occurs in March, and at the quarterly level the highest number of applications occurs at the first quarter, with a declining pattern afterwards. Note also that in September, the month in which the letter was sent, there is no reaction at this group.

Opposite to this pattern, "letter dependents" abruptly react to the letters: almost all applications in this group are performed immediately after receiving the letter in September (65%), and the rest (35%) take place mainly in October and some in November.

#### **4.3 Regression analysis**

We perform a regression analysis of variables affecting appliance before receiving a letter: the dependent variable is a dummy variable that is equal to 1 if he/she applied before receiving the letter in 2010 and 0 otherwise. The observations are based on individuals that applied to the program in all four years and received at least one letter during the four years of the sample. The explaining variables are:

**age\_2007** – individual's age at the beginning of the sample

**age\_squared** - this variable was introduced in order to check a non-linear relationship.

**If\_woman** – a dummy variable that takes the value of 1 if the applicant's sex is female, and 0 if it is male.

**Count\_letters\_2007-2009** – number of letters the individual got in the past (may take values from 0 to 3).

**Sent\_2009** – a dummy variable that takes the value of 1 if the individual applied in 2009 after receiving the letter.

**Cum\_amount\_2007-2009** – total amount of EITC received in previous years.

**Amount\_eligible\_2010** – amount that the individual will receive if applying.

**If\_high\_trapezoid** – a dummy variable that takes the value of 1 if the applicant is a parent of three children or more, being eligible for higher amounts of EITC, and 0 otherwise. This variable represents big families.

**pct\_amount\_from\_household\_income\_2007\_2009** – EITC payments received as a percentage of total household income (two earners).

The following table shows the number of observations that were predicted correctly in the first regression. The total number of observations is 5,619. Results of the regression are shown in Table 5.

**Table 4: Classification Table of observations in the first regression<sup>a</sup>**

Observed			Predicted		Percentage Correct
			if_before_letter_2010 .00	1.00	
Step 1	if_before_letter_2010	.00	1501	660	69.5
		1.00	881	2577	74.5
	Overall Percentage				72.6



**Table 5: What are the determinants for applying before receiving a letter?**

Dependent variable: if_before_letter_2010	B	S.E.	Wald	Sig.	Exp(B)
age_2007	.024	.020	1.430	.232	1.024
age_squared	.000	.000	2.680	.102	1.000
if_woman	-.203	.069	8.658	.003	.817
count_letters_2007_2009	-.039	.048	.666	.414	.961
sent_2009	-1.833	.084	480.449	.000	.160
cum_amount_2007_2009	.00003	.000	4.201	.040	1.000
amount_eligible.2010	-.00006	.000	2.873	.090	1.000
pct_amount_from_household_income_2007_2009	-.941	1.228	.587	.444	.390
if_high_trapezoid	-.095	.081	1.369	.242	.909
Constant	1.148	.431	7.108	.008	3.151

Results show that not all variables have an impact. In particular, the age and age squared are not significant. Being a woman significantly decreases the probability of applying for EITC before receiving the reminding letter.

The most interesting results were obtained for learning and economic incentives. Concerning learning, the number of letters received in previous years was not significant, but the most recent application year – 2010 (income of 2009) – was very significant – self appliers tended to continue and apply on their own, and those who waited for a letter did so also next year.. This result stresses that the persuasive role of the letters is crucial – since in average many individuals still need a letter in order to claim their rights. We will further check this point in the next sub-section.

Concerning financial incentives, two variables were significant: the cumulative amount in 2007-2009 (at 5 percent) which was positive, and the amount eligible in 2010 (at 10 percent), which was negative. We interpret this result as following: the amount received in previous years is known by the applicants and consequently we expect a positive correlation. Concerning the amount received in 2010, the possible explanation is that in this year all eligible applicants received EITC based only on part of their actual worked months , and the single population who received a full year of EITC was women with small children (up to two years) who obviously felt less convenient to apply.

While coefficients are low, the fact that the coefficients for 2007-09 are positive and significant means that financial incentives do play a role in increasing take-up.

In order to increase the sample we looked at the applicants in 2009 and 2010 – i.e., instead of demanding application in all four years we looked at those applicants that

applied in 2009 and 2010 – which allowed us to increase the sample to 17,889 individuals. The following is the detailed classification table:

**Table 6: Classification Table of the second regression<sup>a</sup>**

Observed			Predicted		Percentage Correct
			if_before_letter_2010		
			.00	1.00	
Step 1	if_before_letter_2010	.00	5269	3162	62.5
		1.00	3911	5547	58.6
Overall Percentage					60.5

The results of the regression are shown in Table 7.

**Table 7: A regression for the sample of applicants in 2009 and 2010**

Dependent variable: if_before_letter_2010	B	S.E.	Wald	Sig.	Exp(B)
age_2010	.065	.010	43.459	.000	1.067
age_squared_2010	-.001	.000	42.272	.000	.999
if_woman	-.219	.037	34.803	.000	.804
sent_2009	-.929	.032	837.909	.000	.395
amount_eligible.2009	.000094	.000	35.811	.000	1.000
amount_eligible.2010	.000035	.000	2.872	.090	1.000
pct_amount_from_household_income_2009	1.120	.670	2.795	.095	3.064
pct_amount_from_household_income_2010	-3.888	.939	17.146	.000	.020
if_high_trapezoid	-.149	.038	15.109	.000	.861
Constant	-.777	.215	13.113	.000	.460

In this regression age has a positive and significant impact for application, with a non-linear pattern implying a reduction in marginal application for high ages. Also here we see that applicants that applied after receiving a letter tend to repeat their behavior, since the coefficient is negative.

As before, financial incentives play the expected role: the amount received in 2009 is positive and significant at 1 percent, and at 10 percent in 2010. For the first result it continues to be significant (at 10 percent) when computed as a percent of household income. That is not the case for the percent of household income in 2010, where the coefficient is negative. As before, we interpret this result as

reflecting statistical characteristics of applicants = in particular, mothers with small children.

#### **4.4 The persuasive role of information**

The letter dependent population would have not applied to the EITC without receiving the letter. These individuals are aware of the EITC Program (see next section), and clearly they wait for the letter to apply for a reason that shall be disentangled; a first attempt to understand the reason is performed in the next section.

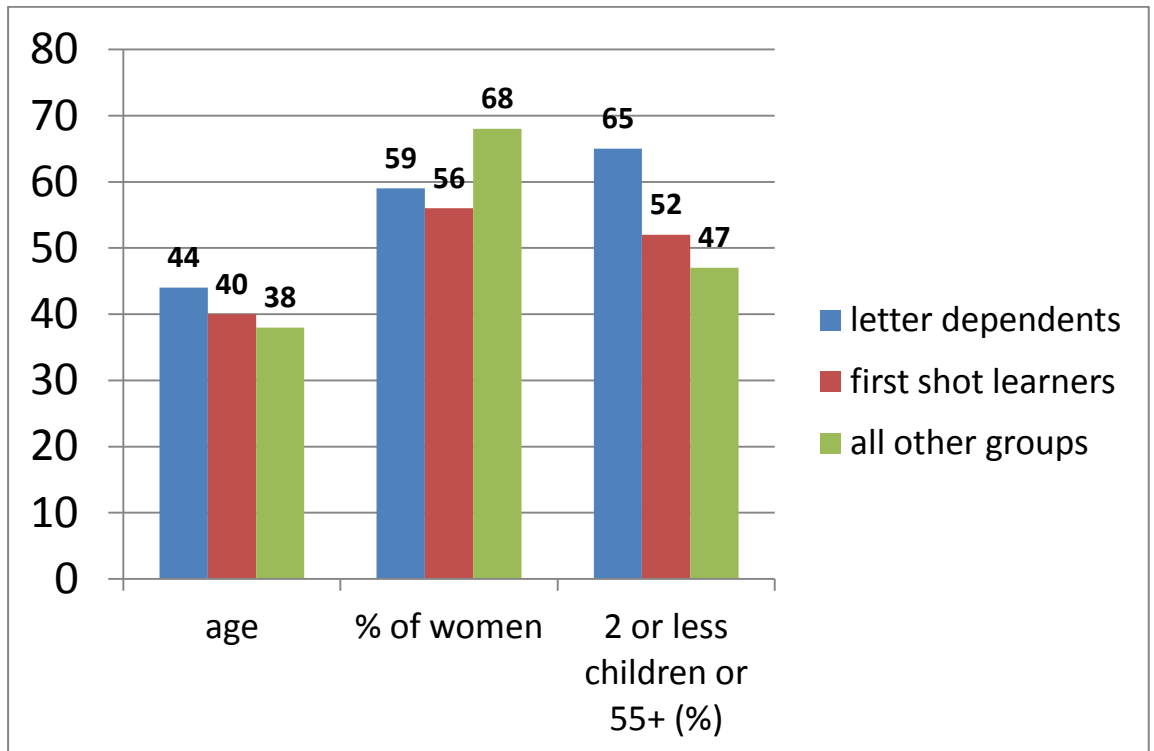
This fact gives us a unique opportunity to estimate the persuasive role of information. We are talking about a population that learned about the system and still wait for the letter in order to apply to the EITC Program. Moreover, since the letter is sent in the last quarter of the year and is a kind of "last chance" call, we believe that it makes the difference between appliance and lack of appliance.

By taking the number of letter dependent individuals, and dividing it by the relatively stable amount of potential applicants, we get that this population amounts 1.5 percent among potential applicants. In other words, the persuasive role of education, based on a conservative estimate, stands at 1.5 percent.

#### **4.4 Characterizing the "letter dependent" population.**

In order to understand the populations that is subject to the persuasive role of information we look at their characteristics as compared to all other groups. Figure 4 summarizes their characteristics in terms of age, sex and their classification to the EITC amount (individuals with two children and 55+ years old receive lower amounts compared to individuals with the same wage that have 3 children).

**Figure 4: Characteristics of the Different learning types**



We learn that two characteristics of the letter dependent individuals are clearly different compared to other groups: letter dependents are older (44 years old compared to 40 for first shot learners and 38 for all other groups) and they receive a lower amount, since 65 percent are with 2 or less children or 55+ years old (compared to 52 and 47 percent for first shot learners and all other groups, respectively).

Since the monetary incentives are particularly interesting, we show a table that compares the amounts received by these three groups.

**Table 8: EITC amounts received by different learning types**

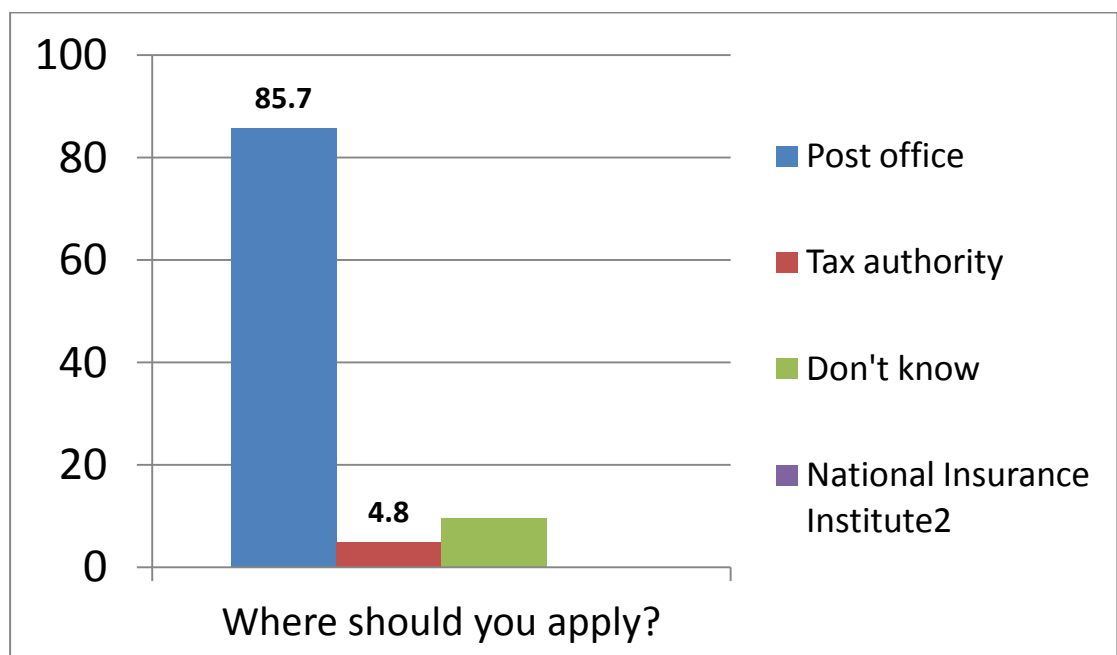
Eligibility year	amount of EITC			pct. diff vs. mean all groups	
	All groups	First-shot learners	Letter dependent	First-shot learners	Letter dependent
2007	3,021	3,079	2,835	1.9%	-6.2%
2008	3,263	3,348	3,064	2.6%	-6.1%
2009	3,359	3,459	3,152	3.0%	-6.2%
2010	1,467	1,376	1,259	-6.2%	-14.2%

Note that letter dependent individuals are characterized by a lower amount compared to other groups (especially in 2010), a fact that is in line with the effectiveness of monetary incentives: the persuasive effect of the letters is effective for a group that has a lower monetary incentive for applying.

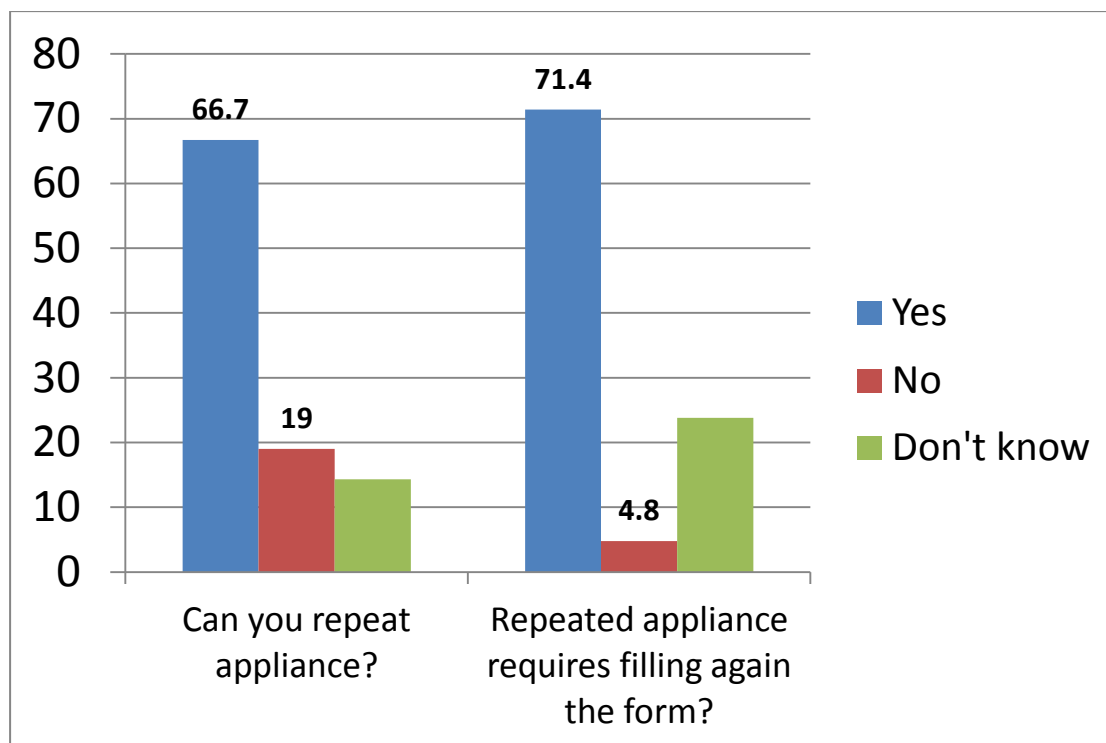
In order to learn more about the letter dependent population, we use information based on questionnaires performed in November 2010 in an experiment designed by the Research Group of the EITC. By cross-checking identification of individuals from the data of Tax Authority and that of the questionnaires experiment, we are able to identify 22 individuals that are letter dependent and answered to many questions related to their knowledge on program parameters and reasons for not applying.

The first question we check is whether this population has learned about the characteristics of the applying process, by looking at their answers to the question: where should you apply? From the answers, shown in Figure 5a, it is clear that these individuals know this information in an excellent standard, since more than 90 percent mention the Post Office and the Tax Authority which constitute the right answer (as we explained before, the application is done at the post office and sent afterwards to the Tax Authority).

**Figure 5a: Letter Dependents basic knowledge about the Program – Where should you apply? (Right answer: post office)**



**Figure 5b: Letter Dependents basic knowledge about the Program – Is it possible to apply in repeated opportunities? (Right answers: "yes" both)**



The second question we look at, is individual's knowledge about the parameters of the program: does the transfer depend on wage?; Does it depend on couple's income? (as we explained before there is a cap in maximum income for a couple); are both members of the couple eligible?; and finally, is the income maintenance amount provided by the National Insurance Institute offset?

In figure 5b we show the percentage of individuals answering to the different categories in these questions.

Note that the most basic question is whether the EITC depends on the wage. 86 percent of individuals knew that this is the case, which clearly constitutes evidence of an acceptable knowledge about the program. In the other questions the right answer was provided only by close to 40 percent of the individuals, but not also that the wrong answer was provided by a relatively low percentage – which means that individuals do have some basic knowledge about the program.

Next we check whether these individuals are "rational maximizers", in the sense that they spend time on checking their rights and inquiring information about the

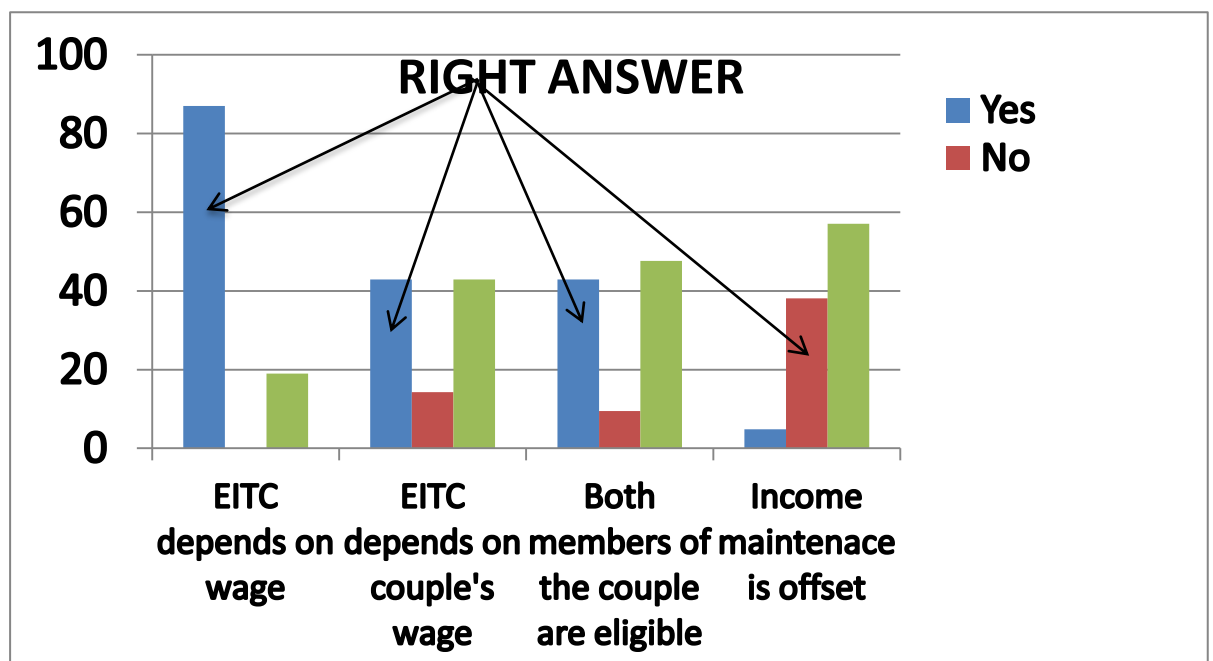
amounts they can get out of EITC application. For this purpose we check their answer to the questions on previous efforts performed for getting the EITC. These answers are shown in figure 7.

We see that most people did not spend efforts on analyzing the information about the possible amount to be received through the EITC system. In particular it is interesting to see that none of letter dependents used the EITC simulator, a device that was actively used by other individual's type.

Summarizing, letter dependent individuals tend to be older than the rest, they do not actively seek for information before applying and they have a lower financial incentive due to lower EITC amounts received.

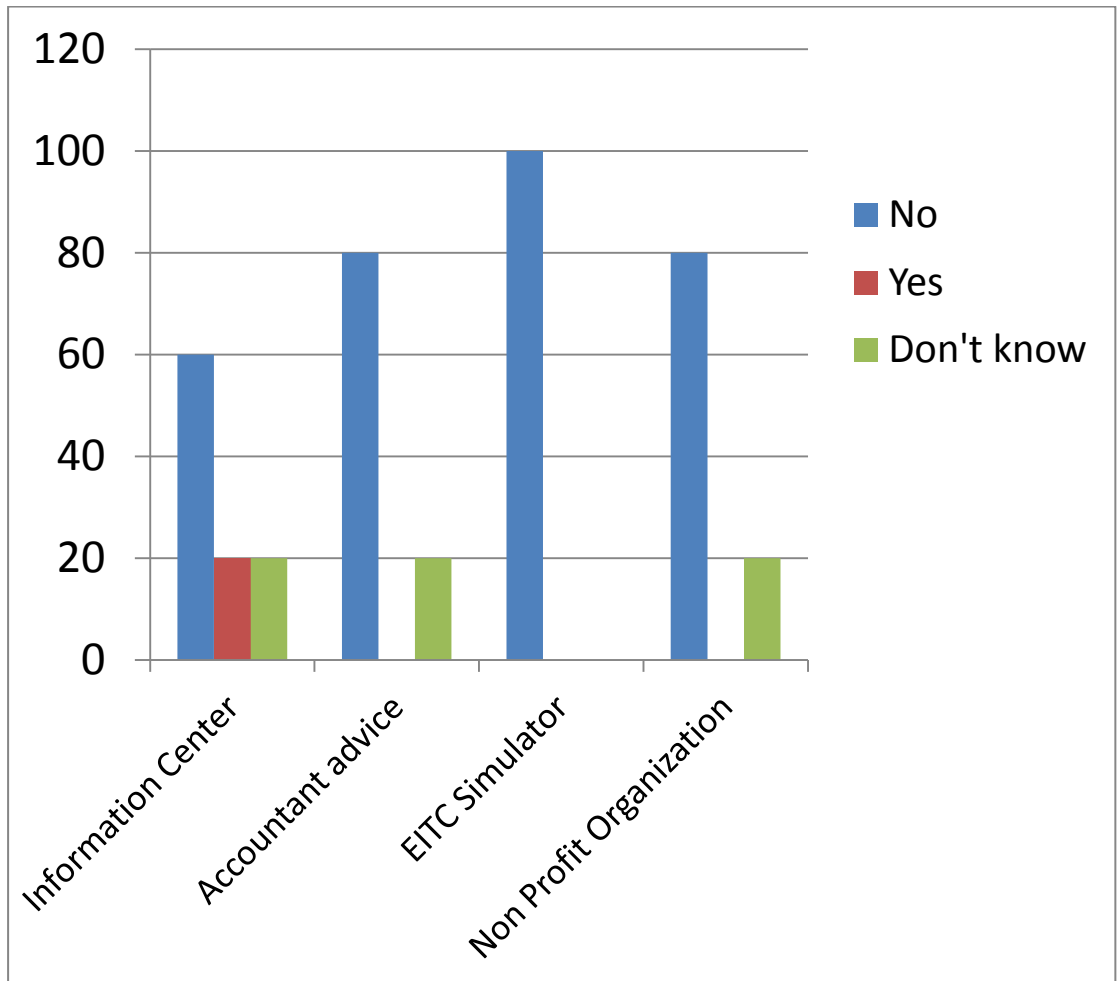
Finally we cross checked this information by taking both FSL and LD populations as they appear at the questionnaire survey. While the number of observations is much lower, the characteristics that are common to the total population look similar – which increases the confidence about reliability of this data. The advantage of this analysis is that it provides detailed information on years of education, and particularly on cultural groups (like arab and ultraorthodox population) and indices of cultural strength – like fluency in Hebrew and English. The results are shown in Table 8.

**Figure 6: Letter dependents knowledge on Program's parameters**



**Figure 7: Are letter dependents "rational maximizers"? Answers to the question:**

**Did you check the amount of the EITC by asking information from...?**



**Table 8: Additional Characteristics of learning types**

Characteristic	First Shot learners	Letter Addict	Letter Dependent
Age	41.8	41.1	45.3
Years of Study	11.5	13.2	12.5
Arabs	58.8%	0%	0%
Ultraorthodox	0%	41.7%	50%
Second Earner	58.8%	41.7%	25%
Hours Worked in 2009	43.5	36.3	41
Problems with Hebrew	6.7%	8.3%	25%
Problems with English	66.67%	66.67%	75%
House Owner	76.4%	60%	66.67%



Results are suggestive: also here we see that the LD population is older. In terms of education results show that all populations are weak – as expected given the income range of the EITC. The most interesting characteristics come from cultural aspects: while the Arab population is a substantial part of the FSL, they do not belong at all to the LD population; the opposite is true for the ultraorthodox: more than 40 percent belong to LA or LD population and none of them are part of the FSL population. Another interesting result is related to second earners: the FS population looks stronger in economic terms, since both members of the family participate at the labor market (58.8 percent); this fact means that they have a strong incentive to participate since the EITC in Israel is applied at the individual level, and thus they get a double amount of subsidy. In the LD population only 25 percent of the families have two earners.<sup>12</sup> Two additional variables indicating that the FSL is a stronger population are less problems with languages (both Hebrew and English) and a higher percent of house ownership.

## **5 Summary and Conclusions**

In this paper we study the behavior of applicants to the EITC that received reminding letters from the Tax Authority in Israel. The sample is composed by individuals that applied to the EITC in all four years of our sample (from 2007 to 2010), and received at least one reminding letter. Since all participants in the sample received a reminding letter in the first year, 2007, that means that those that received a letter only once, applied in the subsequent years before the letters were sent – which in all cases was done toward the last quarter of the year. The choice of this sample is intended to analyze the learning pattern of applicants, by looking at their behavior upon EITC appliance with respect to the reminding letters.

Our study shows that 1.5 percent of applicants are letter dependents – i.e., they wait for the Tax Authority's reminding letter in order to apply for the EITC. Since this letter plays the role of a "last call" - given the timing of the year in which it is sent - we interpret this result as a conservative estimate for the persuasive role of information.

We profited the information provided by independent questionnaires that were performed for a sub-sample of the relevant population, and looked at the characteristics of the letter dependent population. We learned that these individuals are older and that they receive a

---

<sup>12</sup> In the questionnaire only one member of the family was interviewed and thus we know with certainty that each observation represents a family.

lower transfer compared to the other groups analyzed in our sample. We also learned that letter dependents are aware of the main requirements for applying for the EITC, and their knowledge on basic parameters is fairly good. Nevertheless, we found that they do not actively seek for information concerning the amount that they will receive if they apply for the EITC. We also learned that cultural aspects are relevant: the ultraorthodox population is highly represented in the letter dependent population. Another characteristic of the letter dependent population is that there is a lower percent of households with a second earner, and a higher percent of problems with fluency in languages (Hebrew and English).

A regression analysis allowed us to learn about the reaction of applicants to financial incentives. While the reaction to the amount received in real time was not always significant, we found that the amount received in previous years drive applicants to improve their learning pattern and to apply before receiving a letter. The coefficient of a received letter in previous years increases the probability of waiting for a letter in the following year, a result that stresses our findings about the persuasive role of the reminding letters on applicants' behavior.

## References

- Bar T., V. Kadiyali and A. Zussman (2009), "Grade information and grade inflation: the Cornell experiment", *Journal of Economic Perspectives*, vol. 23, No. 3, pp. 93-108.
- Bertrand, M., Mullainathan, S. and E. Shafir (2006), 'Behavioral Economics and Marketing in aid of decision-making among the poor', *Journal of Public Policy and Marketing*, 25 (1), 8-23.
- Blumenthal, M., B. Erard and C. Ho (2005), "Participation and compliance with the earned income tax credit", *National Tax Journal*, 58, 189-213.
- Currie, J., (2006). "The Take-up of Social Benefits", in "Poverty, *The Distribution of Income, and Public Policy*", edited by A. Auerbach, D. Card, and J. Quigley, pp. 80-148, New York: Russell Sage.
- Ebenstein A. and K. Stage (2010), "Does inconvenience explain low take-up?: evidence from UI claiming procedures", *Journal of Policy Analysis and Management*, 29 (1), 111-136.
- Hotz, J. and J. Scholz (2003), "The earned income tax credit", in Means-tested transfer programs in the United States, edited by R. Moffit, University of Chicago Press and NBER.
- Hurwitz, M. and R. Caves (1988), "Persuasion or information? Promotion and the shares of brand names and choice behavior of consumers new to a market", *Journal of Marketing Research*, 37, 139-155.
- Karlan, D., M. McConnell, S. Mullainathan and J. Zinman (2010), "Getting to the top of mind: how reminders increase saving", NBER Working Paper, No. 16205.
- Leffler, K. (1981), "Persuasion or information? The economics of prescription drug advertising", *Journal of Law and Economics*, 24, 45-74.
- Narayanan, S., P. Manchanda and P.K. Chintagunta (2003), "The informative versus persuasive role of marketing communication in new product categories: an application to the prescription antihistamines market", SSRN.
- Plueger, D. (2009), "Earned income tax credit participation rate for tax year 2005", Internal Revenue Service, available at: <http://www.irs.gov/pub/irs-soi/09resconeitcpart.pdf>.
- Storey, P. and R. Chamberlin (2001), "Improving the take up of free school meals", Thomas Coram Research Unit, Institute of Education, Dept. of Education and Employment, RR270.

Wiseman, M. (2007), "The American Earned Income Tax Credit", Manuscript prepared for the International Conference Innovations in Labour Market Policies: Challenges in Times of Globalization, Wien, 16-17 February.