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Speaking in the Context of the Present Boosts Saving Among Bilinguals

Celeen N. Sanchez[1*], Nathan Kyle T. Camarao[1], Kevin Craig F. Tan[1] and Ramon Mikael S. Cabazor[1]
[1] *School of Economics, De La Salle University*
2401 Taft Avenue, Manila 1004
**Corresponding Author: celeen_sanchez@dlsu.edu.ph*

Abstract: We extend Keith Chen's work (2013) on the effect of language on saving. In this, he assumes that the language spoken at home dominates a person's beliefs about the future and thus such person's saving behavior. Would this hold for bilinguals? Rather than focusing on the effect of the mother language on thrift, we progress by controlling a bilingual's mother tongue and allowing such bilingual's second language (L2) to vary. This is to find contrast in saving behaviors driven by the L2. We observe that the L2 dilutes the effect of the mother language. The likeliness to save is stronger among L2 speakers of languages that treat the future and the present similarly than L2 speakers of languages that treat the future and the present separately. However, our results apply only in Africa, Europe, and high-income countries.

Key Words: language; future time reference; savings behavior; Sapir-Whorf hypothesis; bilingualism

1. INTRODUCTION

Our thesis extends Keith Chen's (2013) work, which provided the first evidence from Economics that language shapes behavior. In it, he showed via a conditional logit model that speakers of languages that do not grammatically separate present and future (Weak-FTR languages) save 31% more than speakers of languages that do separate present and future (Strong-FTR).

Last year, Garcia and Largoza (2015) took a Philippine sample and using similar techniques showed that Cebuano speakers (Weak-FTR) hold 37% more cash and 52% more non-cash assets than Tagalog speakers (Strong-FTR) all things constant. This implies a significant relationship between speaking a Weak-FTR language and saving more; and speaking a Strong-FTR language and saving less.

The Philippine result however raises the interesting question of how bilingualism influences this relationship. If a bilingual speaks two Weak-FTR, or two Strong-FTR languages, is the behaviour amplified? On the other hand, if she speaks one of each type, is the behaviour mitigated?

Consider two cases: in the first, a bilingual person speaks two languages that both grammatically separate present and future. According to Chen (2013), this makes the future seem farther to the speaker and would cause the speaker to be less future-oriented, and also save less. We argue that if a bilingual speak two such languages natively, the effect would be magnified and she might save even less.

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On the other hand, a bilingual who speaks one language that grammatically separates present and future, and one that does not might find the effect on saving behavior mitigated. And because bilinguals use language rather unsystematically throughout their lives (Grosjean, 2013), we are better off observing the effect on saving in the long run, rather in controlled experiments.

Research in business have found that firms that use Weak-FTR keep bigger precautionary cash holdings and companies that reside in Weak-FTR regions are likely to hold more cash—supporting Chen's findings (Chen, S. et al., 2015). Likewise, corporations that use Strong-FTR languages performed weak on corporate social responsibility and sustainability but finds reduced Strong-FTR effect for those open to international languages since being based in globalized and highly internationalized countries, and have cosmopolitan CEOs (Liang, et al., 2014).

2. METHODOLOGY

2.1 Framework

In this section we present an alternative to Chen's (2013) linguistic-savings model modified to allow bilinguals. We consider a model of four bilinguals. To begin with, there are two bilinguals who speak pure FTRs: a person who speaks a Weak-FTR home language and another Weak-FTR language and a person who speaks a Strong-FTR home language and another Strong-FTR language. We denote them as W+W and S+S bilinguals.

Then, there are two more bilinguals who speak one of each FTR type: a person who speaks a Weak-FTR home language and another Strong-FTR language, and a person who speaks a Strong-FTR home language and another Weak-FTR language. We denote them as W+S and S+W bilinguals.

Here, like Chen's model, we consider his two mechanisms, that is prescribed grammatical tenses and their precision of detailing time influence individuals' perception of time. We then add another mechanism which we assume to also affect individuals' beliefs of time, this concerns with the randomness of how bilinguals process language. All bilinguals are assumed to save if and only if

$$C < \int e^{-\delta t} R dF(t) \tag{1}$$

future reward R, influenced by the beliefs function $F(t)$ a person holds at time t and its discounting rate δ; is greater than present cost C.

2.1.1 Mechanism One: Grammatical tenses divide perceived time.

Language tenses can affect our perception of time. On one hand, we perceive the future far from the present when we speak languages that require future tenses. This happens provided that future tenses lead you to divide time thoroughly in mind. (Chen, 2013)

This mechanism affects F(t), our beliefs function. Since S+S bilinguals speak two Strong-FTR languages, they tend to constantly divide future time from present time and thus believe that the future is far. Hence, S+S speakers must discount the future most and have the narrowest beliefs functions as compared with other bilinguals, $\delta_{WW} < \delta_M < \delta_{SS}$ and $F_{WW}(t) \geq F_M(t) \geq F_{SS}$. Consequently, the notation becomes

$$if\ \delta_{WW} < \delta_M < \delta_{SS},$$
$$then \int e^{-\delta_{WW} t} RdF(t) > \int e^{-\delta_M t} RFd(t) > \int e^{-\delta_{SS} t} RFd(t) \tag{2}$$

and

$$if\ \forall t, F_{WW}(t) \geq F_M(t) \geq F_{SS}(t),$$
$$then \int e^{-\delta t} RdF_{WW}(t) \geq \int e^{-\delta t} RdF_M(t) \geq \int e^{-\delta t} RdF_{SS}(t) \tag{3}$$

where δ_{WW}, δ_M and δ_{SS} are discount rates and F_{WW}, F_M and F_{SS} are beliefs functions of bilinguals who speak two Weak-FTR languages, another who speak either one of Weak-FTR or Strong-FTR languages, and another who speak two Strong-FTR languages.

2.1.2 Mechanism Two: Time-specific grammars result to more accurate thoughts.

We also assume that the use of grammatically time-specific languages results to exact perceptions of the future. (Chen, 2013) At present, there are no studies that demonstrate the effect of detailed time markers of languages on having exact views of the future. However, this is observed in counting. Owens (2001) finds that people speaking 'Enga', language spoken by a community in New Guinea, does not have a detailed counting system. This group does not have much wealth to count. Not having a detailed counting system may have lead Engans to not obtain further wealth.

Consequently if language effect on counting also holds for beliefs in the future, then speaking about time in a detailed manner lead to having more accurate beliefs for the future. Hence, speakers of languages that require the use of time-specific grammars (that is Strong-FTR languages) save less. In contrast, speakers of languages that do not

require the use of time-specific grammars (that is Weak-FTR languages) save more.

2.1.3 Mechanism Three: Bilinguals process language randomly.

Languages, among bilinguals, neither operate simultaneously in mind nor do they function apart. Grosjean (2013, 16-17) stresses that "*perceptual processing* [bilingual language processing] *is nonselective*", thus saying languages operate randomly in a bilingual mind. For instance, when bilinguals read an unfamiliar text they tend to consult both languages in mind to understand the material more.

However, languages can also work in a particular manner. Grosjean suggests that this is accomplished by priming the language of interest on subjects. For example, if we want bilinguals of both Cebuano and Filipino to operate only in Cebuano, the researcher could prime Cebuano so that bilinguals will consult only in their Cebuano language. This means that although languages are naturally nonselective, there are times that languages operate selectively. Thus saying that there are situations when one language is used and there are also situations when both languages function at the same time.

Since W+S bilinguals speak a Weak-FTR language at home and are able to speak in some Strong-FTR language, they tend to either disjoin or connect the future and the present; and hence believe that the future is either far or near in their lifetimes. Likewise, since S+W bilinguals speak a Strong-FTR language at home and are able to speak in some Weak-FTR language, they also tend to either disjoin or connect the future and the present; and thus believe that the future is either far or near in their lifetimes. Therefore, W+S and S+W speakers must discount the future either at a higher or lower level and have either a narrower or wider beliefs functions as compared with other bilinguals.

2.2 Data

We use data from 1981 to 2014 waves of the World Values Survey (WVS). This data is a worldwide survey on cultural values, identities, and etcetera. It contains 1,377 variables and 343,309 individual observations, although only 22 variables and 1,914 observations are used after dropping immigrants and non-bilinguals.

The WVS lacks a crucial variable for this paper –bilingualism data. This will control for language-specific effects on individual behavior and will extract the effect of a bilingual's second language on her saving. We exploit a person's language at home and language in which the interview was conducted. There are four bilingual types:

Table 0.1 Types of Bilinguals

Bilingual	Home Language	Interview Language	Code	Example
1	Weak-FTR	Weak-FTR	W+W	Mandarin and Hakka
2	Weak-FTR	Strong-FTR	W+S	Japanese and Spanish
3	Strong-FTR	Weak-FTR	S+W	Italian and German
4	Strong-FTR	Strong-FTR	S+S	Hausa and English

Notes to Table 0.1. Data are from the World Values Survey (WVS) 1981-2014 LONGITUDINAL AGGREGATE v.20150418. World Values Survey Association (www.worldvaluessurvey.org). Aggregate File Producer: JDSystems, Madrid SPAIN. The sample is exclusive to subjects having dissimilar home languages and interview languages. Non-bilinguals are dropped in all regressions. Table 0.1 presents four bilingual types in which the regressions were based and include examples for each type.

2.3 Estimation Technique

We use the fixed-effects logit model in our cross-country regressions to measure the likeliness to save of each bilingual type. To do this, we increasingly constrain our regressions to variables such as age and sex, legal origins, log of per capita gross domestic product (ln PCGDP), growth rate of PCGDP, unemployment, interest rate, individual and country average views on trust and family is important, language controls, continent fixed effects, and PCGDP; to test if the likelihood to either save or not save persists across countries. This allows us to compare bilinguals that have the exact characteristics but reside in differing countries and are unalike in bilingual type.

We then run regressions fixed by continent and by PCGDP to test if the probability for saving remain when language effects are grouped by continent and when language effects are grouped by income per individual.

In the same way, we use the fixed-effects logit model in our within-country regressions to measure the likeliness to save of each bilingual type. We do this with the use of employment status, views on trust and family is important, with the addition of 'saving is an important value to teach children' (as proxy for saving culture), and group fixed effects such as country and wave, income and education, marital status and number of children; to test if the likelihood to either save or not save persists within countries. This allows us to compare bilinguals that have the exact characteristics and reside in the same country but are unalike in bilingual type.

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Then after, we rerun within-country regressions on Nigeria and Switzerland, which are countries having large within-country FTR differences. This means that residents of Nigeria and Switzerland have sufficient observations that either speak 'Weak-FTR' or 'Strong-FTR' home languages. This is to examine if the effect of language on saving holds among multilingual countries.

We run another set of regressions but with added fixed effects for religion and country's FTR variation (percent of bilinguals speaking either Strong-FTR or Weak-FTR home languages in a country). This is to examine if the effect of language on saving holds when religion is controlled. This is since religion may impose distinct saving values. Similarly, we control for FTR variation to test if saving holds in multilingual countries.

3. RESULTS AND DISCUSSION

3.1 Cross-country regressions

We adopt Chen's (2013) logit model on our cross-country regressions:

$$\Pr(save_{it}) = \frac{\exp(z_{it})}{1+exp(z_{it})}, \quad (4)$$

where:

$$z_{it} = \beta_0 + \beta_1 Bilingual + \beta_2 X_{it} + \beta_3 X_t + \beta_4 F_{it}^{ex} + \beta_5 F_t^c. \quad (5)$$

The dependent variable is $save_{it}$, or the probability that person i at time t will save, is affected by several independent variables. *Bilingual* is a dummy variable equivalent to 4 bilingual types. X_{it} is a matrix of individual i characteristics at time t. X_t is a collection of characteristics of a country at time t, such are its legal system, economy, and country averages like trust. Other variables to fix relevant effects include F_{it}^{ex}, for inborn individual characteristics (age and sex); and F_t^c to address continental differences. Immigrants are dropped from the sample. We use W+S as the baseline variable for comparisons.

Table 1: A Bilingual Saved This Year (Cross-Country Analysis)

	(1) Saved	(2) Saved	(3) Saved	(4) Saved	(5) Saved	(6) Saved
S+W	1.514	1.185	1.155	1.156	1.157	1.049
	[0.534]	[0.308]	[0.289]	[0.290]	[0.295]	[0.360]
S+S	2.79	1.813	1.4	1.369	1.376	1.136
	[1.686]	[0.357]**	[0.203]*	[0.217]*	[0.208]*	[0.286]
Legal Origins and Log Per Capita GDP included?	No	Yes	Yes	Yes	Yes	Yes
Growth of PCGDP, Unemployed, Real Interest Rate and WDI Legal-Rights Index included?	No	No	Yes	Yes	Yes	Yes
Trust and Family is Important included?	No	No	No	No	Yes	Yes
Trust and Family is Important (country averages) included?	No	No	No	No	Yes	Yes
Language share and FTR share included?	No	No	No	No	No	Yes
Fixed Effects:						
Age × Sex	Yes	Yes	Yes	Yes	Yes	Yes
Continent	No	No	No	Yes	Yes	Yes
Observations	1909	1909	1876	1876	1876	1876

We drop all W+W speakers due to too few observations. Table 1 shows that S+S speakers are 38% more likely to save than W+S speakers. This is inconsistent with our hypothesis where S+S speakers should save the least than S+W and W+S bilinguals. This may show that not all S+S speakers follow our hypothesis.

Table 2: WVS Cross-Country Analysis by Continent and PCGDP

					Variable	Odds Ratios	SE	N
Regression restricted by continent:								
				Africa	S+W	0.747	[0.012]**	1602
					S+S	1.565	[0.037]**	
				Europe	S+W	1.011	[0.131]	154
					S+S	0.34	[0.150]*	
				Americas	S+W	1	[0.000]	71
					S+S	1	[0.000]	
				Asia	S+W	-	-	-
					S+S	-	-	
Regression restricted by PCGDP:								
		PCGDP	≤	1,000	S+W	0.667	[0.000]	1227
					S+S	1.281	[0.000]	
1,000	<	PCGDP	≤	5,000	S+W	1.000	[0.000]	426
					S+S	1.000	[0.000]	
5,000	<	PCGDP	≤	25,000	S+W	1.000	[0.000]	109
					S+S	2.499	[0.638]**	
		PCGDP	>	25,000	S+W	0.197	[0.180]	67
					S+S	0.024	[0.038]*	

In Africa, S+W speakers are 75% as likely to save compared to W+S speakers. Also S+S speakers are 57% more likely to save than W+S speakers. The less saving of S+W bilinguals supports our hypothesis that S+W speakers save less than W+S speakers. Moreover, in Europe, S+S speakers are only 34% as likely to save compared to W+S speakers. This directly supports our hypothesis of S+S speakers saving the least among bilingual types. We believe that FTR effect may be spatially correlated, like in Europe where there is a concentration of Weak-FTR speakers in one region.

In addition, restricting regressions per capita GDP considerably differ results for bilinguals who speak S+S languages. In moderately high-income countries, S+S bilinguals tend to save 2.5 times more

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likely than W+S bilinguals. However, in high-income countries, S+S bilinguals tend to save only 2.4% than W+S bilinguals. The result in high-income countries supports our hypothesis that speaking S+S languages amplifies decreased saving of Strong-FTR native speakers. This may indicate that the effect of Strong-FTR is income biased. Hypothetically, saving can be saturated to a point where no further increase in saving helps at a high-income level. Hence, Strong-FTR effect may be exclusive to high-income countries.

3.2 Within-country regressions

The next regressions below are adopted from Chen's (2013) conditional fixed effect logit model:

$$\Pr(save_{it}) = \frac{\exp(z_{it})}{1+exp(z_{it})}, \quad (7)$$

where:

$$z_{it} = \beta_1 Bilingual + \beta_2 X_{it} + \beta_3 F_{it}^{ex} \times F_{it}^{en} \times F_t^c. \quad (8)$$

The dependent variable is $save_{it}$, or the probability that person i at time t will save, is affected by several independent variables. *Bilingual* is a dummy variable equivalent to 4 bilingual types. X_{it} is a matrix of individual i characteristics at time t. X_t are a set of country specifications at time t. Other variables to fix relevant effects such as F_{it}^{ex}, for inborn individual characteristics (age and sex); F_{it}^{en}, for endogenous features that can change over time like one's income, education, marital status, and having children; and F_t^c to address continental differences. Immigrants were dropped from the sample.

Table 3: A Bilingual Saved This Year (WVS, Within-Country Analysis)

	(1) Saved	(2) Saved	(3) Saved	(4) Saved	(5) Saved	(6) Saved
S+W	1.514 [0.534]	1.59 [0.327]**	1.57 [0.344]**	2.06 [0.195]**	2.684 [0.711]**	2.665 [0.771]**
S+S	2.79 [1.686]	1.438 [0.372]	1.473 [0.365]	1.124 [0.061]*	1.118 [0.151]	1.114 [0.112]
Unemployed included?	No	No	Yes	Yes	Yes	Yes
Trust and Family is important included?	No	No	No	No	Yes	Yes
Saving is Important (to teach children) included?	No	No	No	No	No	Yes
Fixed effects:						
Age*Sex	Yes	Yes	Yes	Yes	Yes	Yes
Country*Wave	No	Yes	Yes	Yes	Yes	Yes
Income*Edu	No	Yes	Yes	Yes	Yes	Yes
Married*Num Chil	No	No	No	Yes	Yes	Yes
All Fes	Yes	Yes	Yes	Yes	Yes	Yes
Interacted						
Observations	1905	358	358	133	133	133

Our within-country regressions show that S+W speakers are 3 times more likely to save than W+S speakers. This may posit that an individual's second language may dominate a person's behaviour or mitigate the effect of their native language to their behaviour. We, like Chen, use 'Saving is important to teach children' as proxy for culture. The correlation between culture and 'Strong-FTR' home languages is insignificant ($corr = 0.03, \rho = 0.18$). This is in contrary with Chen's results, which finds that language FTR effect is independent of culture.

Table 4: WVS Countries with Large Within-country FTR Differences

Country	Weak-FTR Languages	%	Strong-FTR Languages	%	Variable	Coef.	SE	N
Nigeria	Yoruba	40	English, French, Hausa, Igbo, Spanish	60	S+W	3.503	[4.164]	9
					S+S	0.961	[0.649]	
Switzerland	German	62	French, Italian, Spanish	38	S+W	1.000	[0.000]	4
					S+S	8.13E+15	[0.000]	

Table 4 shows that restricting regressions in Nigeria and Switzerland does not significantly make speaking S+W and S+S languages affect saving behavior. Results in Table 4 are inconsistent with our hypothesis that S+W speakers save less than W+S speakers and S+S speakers save even less than S+W speakers. This may imply that S+W and S+S bilinguals in Nigeria save differently and that FTR does not affect their propensity to save.

Table 5: Additional Within-Country Control Regressions in the WVS

	(1) Saved	(2) Saved	(3) Saved	(4) Saved	(5) Saved
S+W	1 [0.000]	3.865 [0.532]**	0.506 [0.478]	0 [0.000]	0 [0.000]
S+S	1 [0.000]	0.969 [0.066]	0.188 [0.217]	0.791 [0.726]	0.809 [0.772]
Unemployed, Trust, and Family is Important included?	Yes	Yes	Yes	Yes	Yes
Saving is Important (to teach children) included?	Yes	Yes	Yes	Yes	No
Language share and FTR share included?	No	No	Yes	Yes	Yes
Full set of FEs from reg 5 in Table 3.1	Yes	Yes	Yes	Yes	Yes
Religion Fes	No	No	No	Yes	Yes
All Fes Interacted	Yes	Yes	Yes	Yes	Yes
Country's FTR Variation	<5% (2)	>5% (2)	All	All	All
Observations	30	103	133	60	60

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Table 5 shows that in countries having greater than 5% FTR variation, S+W bilinguals save more than W+S bilinguals. Only in column 2 where speaking S+W languages make a bilingual save 3.9 times more than speaking W+S languages. Columns 4 and 5 show that adding religion fixed effects does not improve S+W and S+S effect on saving. Results in Table 5 are inconsistent with our hypothesis that speaking S+W languages make one save less than W+S speakers and speaking S+S languages make one save even less than W+S speakers. S+W speakers save 3.9 times more likely to save than W+S speakers. This may imply that having a Weak-FTR second language make a bilingual save more. Moreover, one's second language may significantly influence one's likeliness to save even for Strong-FTR native speakers.

4. CONCLUSIONS

This paper tests the effect of being able to speak in both languages that use varied tenses and identical tenses on whether bilinguals either take more future-inclined actions or take less of them. We find that there is a correlation with speaking two Strong-FTR languages and saving less, and speaking in a Strong-FTR home language and another Weak-FTR language and saving less. However, this prediction holds only for S+S speakers in Europe and S+W speakers in Africa. This may indicate that the effect of language FTR is spatially correlated and influenced by geographical location and climate. Moreover, we find that S+S speakers save less than W+S speakers in high-income countries, suggesting that the effect of language FTR may be income biased. We also test if language FTR is correlated with culture. Our findings suggest that the correlation of language FTR with culture is insignificant. This is contrary to Chen's findings, which state that language FTR effect is independent of culture. This may imply that controlling for bilingualism makes the relationship of FTR and culture insignificant. Furthermore, our results advocate the need to control for bilingualism in language-specific correlational studies. We suggest including information on bilingualism and/or other languages spoken (multilingualism) in gathering future household surveys such as the WVS.

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