

Language Acquisition of U.S. Children

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This report is released to inform interested parties of ongoing research and to encourage discussion of work in progress.

Any views expressed on methodological issues are those of the authors and not necessarily those of the U.S. Census Bureau.

Research Questions:

- How do children from non-English speaking backgrounds acquire English?
- What is the pace at which this occurs?
- How important are *age* and *amount of time exposed to English*?
- What other factors are important?

Data:

- The 2005-2007 American Community Survey (ACS) multi-year file.
- ACS is a large national continuous survey designed to replace the Census long form.
- Mailout of 250,000 households a month; telephone and personal visit follow-up.
- About 2 million interviews a year, weighted to July 1 population controls.

Data cont.

- Provides detailed socio-demographic data for many subpopulations and geographic areas.
- Multi-year files provide ever larger samples.
- This 3-year file has 5,837,976 sample households and 13,676,996 sample persons, which includes those living in group quarters.

Language Question:

- 3-part self-response question on language spoken and English-speaking ability
- Asked only of the population 5 years and older
- Respondent provides language other than English (381 unique languages coded)
- Respondents also self-reported English-speaking ability
- Reports have shown to associate “well” with ability
(see Kominski, Robert. 1989. How Good is “How Well”? An Examination of the Census English-Speaking Ability Question. Presented at the Annual Meeting of the American Statistical Association. Washington D.C.)

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a. Does this person speak a language other than English at home?

Yes

No → SKIP to question 14

b. What is this language?

For example: Korean, Italian, Spanish, Vietnamese

c. How well does this person speak English?

Very well

Well

Not well

Not at all

} LTVW

Language Acronym Cheatsheet:

- **PLOTE** – Potential Language Other Than English
- **LOTE** – Language Other Than English (at home)
- **LTVW** – Spoke English Less Than “Very Well”
- **NAA** – Spoke English “Not At All”

Universe of Interest:

- Not all children eligible for study
- However, many came from non-English language-speaking backgrounds
- We attempt to identify children who
 - have some personal reason to possibly speaking LOTE: they are LOTE or they are not native born
 - live in a household where LOTE is possible: there are other LOTE speakers, their parents are immigrants, etc.
- These children are:
Potential **L**anguage **O**ther **T**han **E**nglish **S**peakers – **PLOTES** (gives us an upper bound population to study)

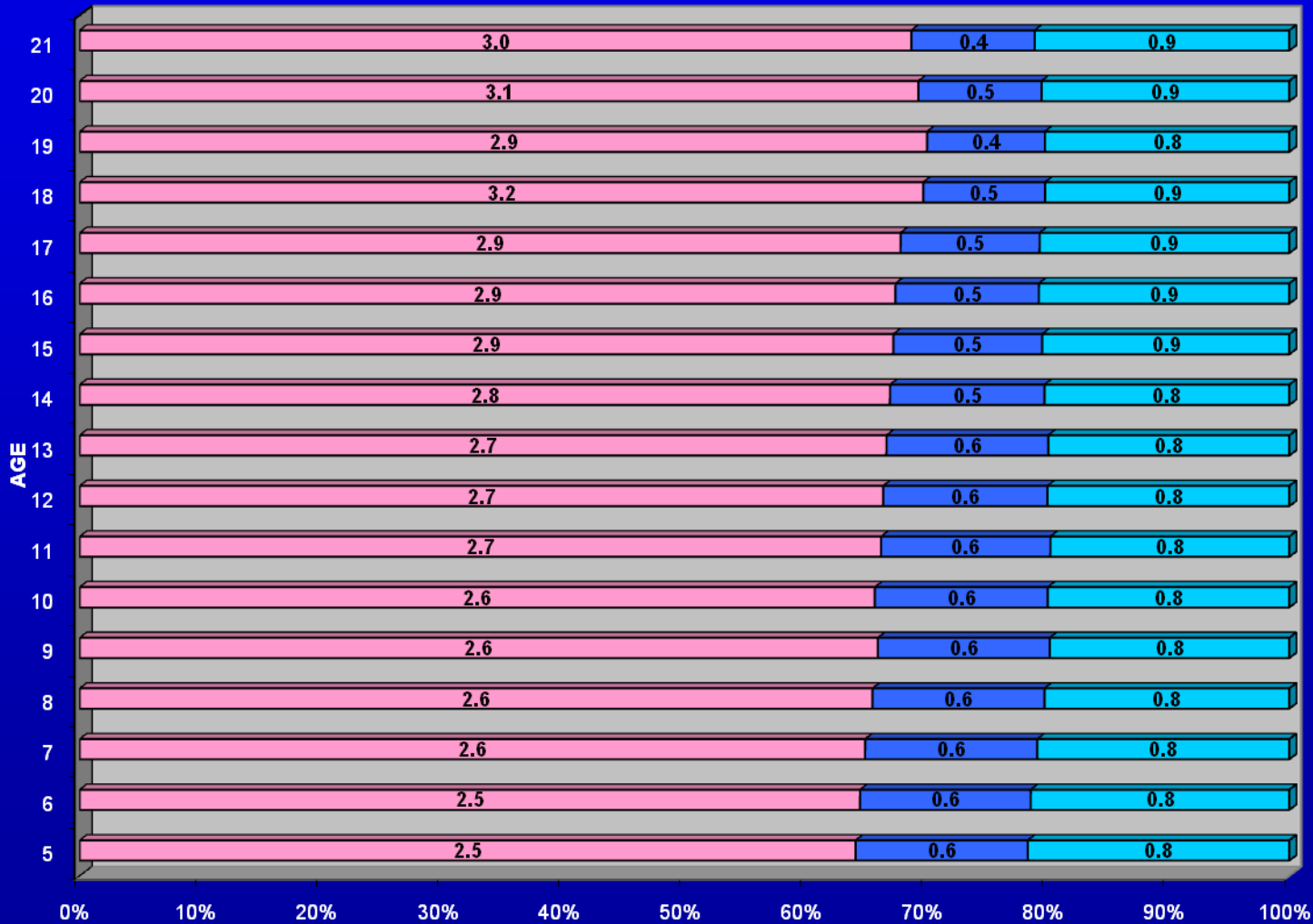
Figure 1. Children 5-21 Years by PLOTE Status: 2006-2008

(In millions)

1. Non-PLOTE kids

2. PLOTE residual

3. Kids are LOTE



1. Non-PLOTE kids are those who live in a household where everyone speaks only English or are native born

2. PLOTE residual are kids who are foreign-born or who live in a household with someone else who is either LOTE or foreign born*

3. LOTE kids are kids who speak a language other than English

* While those born in Puerto Rico, in an outlying area, or born abroad of American parents are not foreign-born, for the purposes of this analysis, they are considered foreign born because they may have exposure to languages other than English.

Method of Analysis:

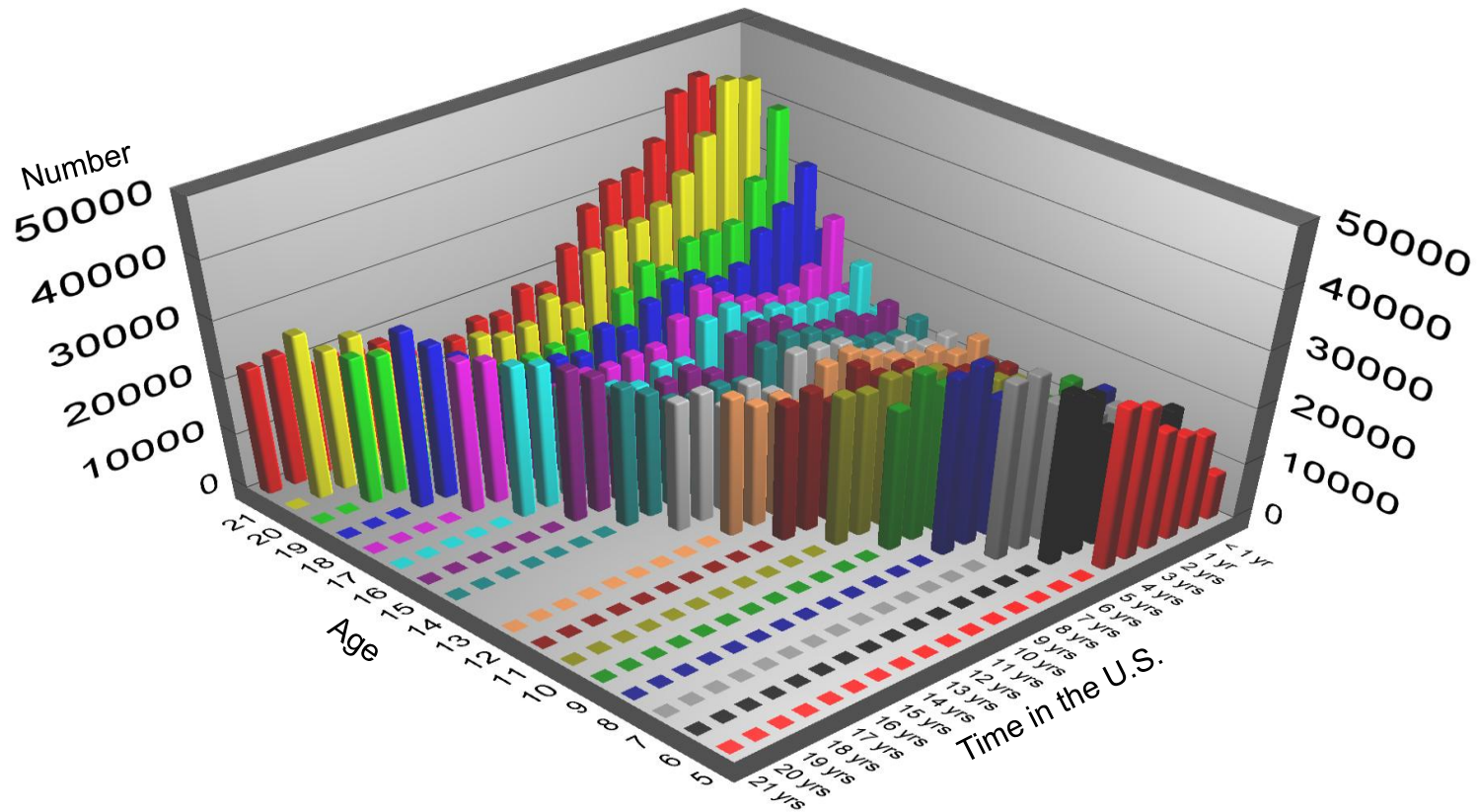
Two ways to study the issue

- 1) TABULAR – create a large detailed single year of age by single year of U.S. residence duration for English-language likelihood.
- 2) MODEL – logit regression of likelihood of speaking a non-English language by age, residence duration and other variables of interest (e.g. enrollment status, household income, and the number of people in the household who are LOTE)

Specific Issues for Study

- 1) What proportion of children, aged 5-21 years speak LOTE given they are PLOTES?
 - 2) What proportion of children speak English less than “very well?”
 - Children who speak English less than “very well” may have language needs.
 - 3) What proportion of children spoke English not at all?
 - Children who speak no English are at a distinct disadvantage conversing with English-only speakers. It could hinder their ability to follow instructions in school, to achieve higher levels of educational attainment, or apply for jobs.
- Proportions examined in tabular format
 - Likelihoods are estimated in model approach.

Figure 2. How Many Children are PLOTE?

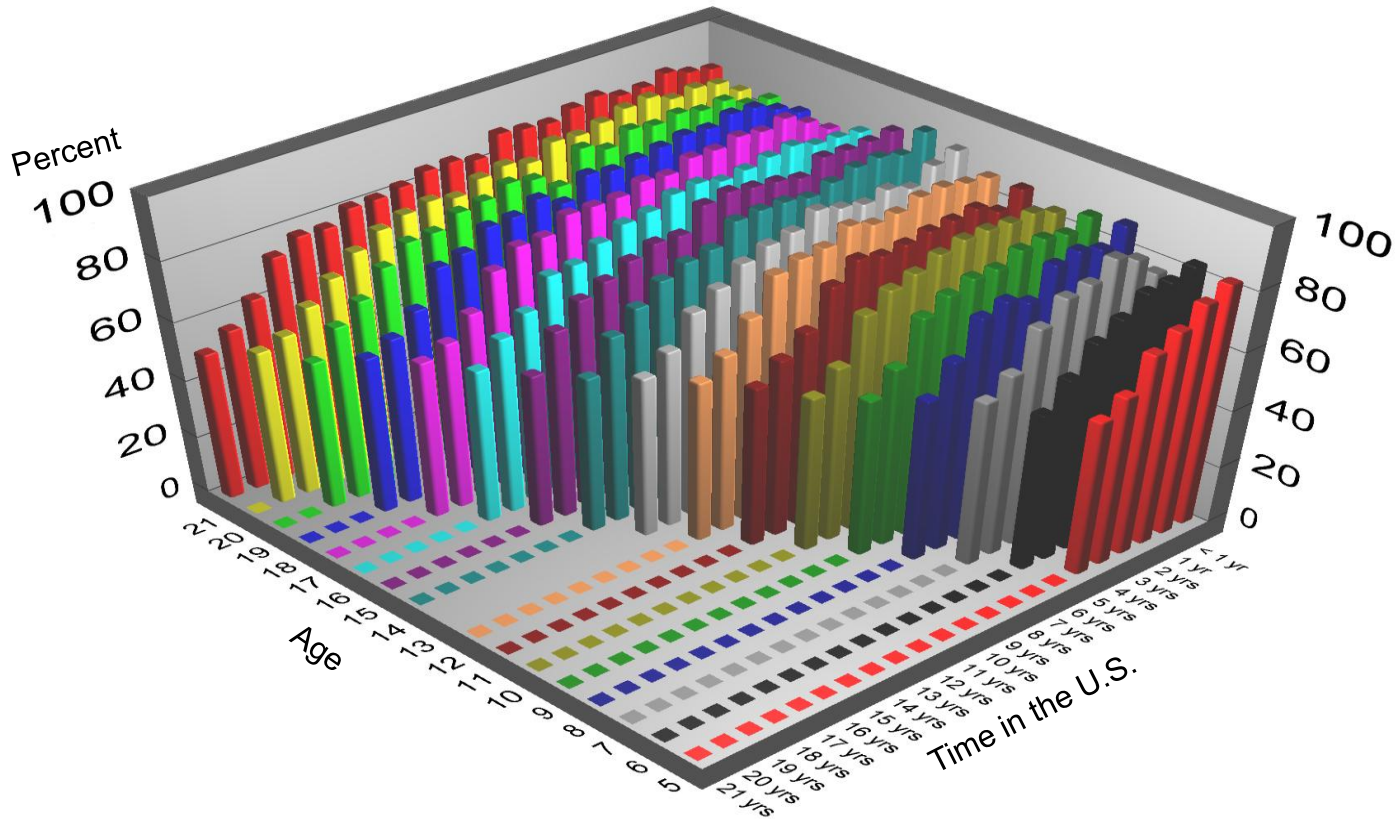


Source: U.S. Census Bureau, 2006-2008 American Community Survey

Note: Graphic excludes native kids

- There are large numbers of PLOTES at higher ages with small duration times
- Another large group are persons who have lived here their entire lives

Figure 3. What proportion of PLOTES speak LOTE?

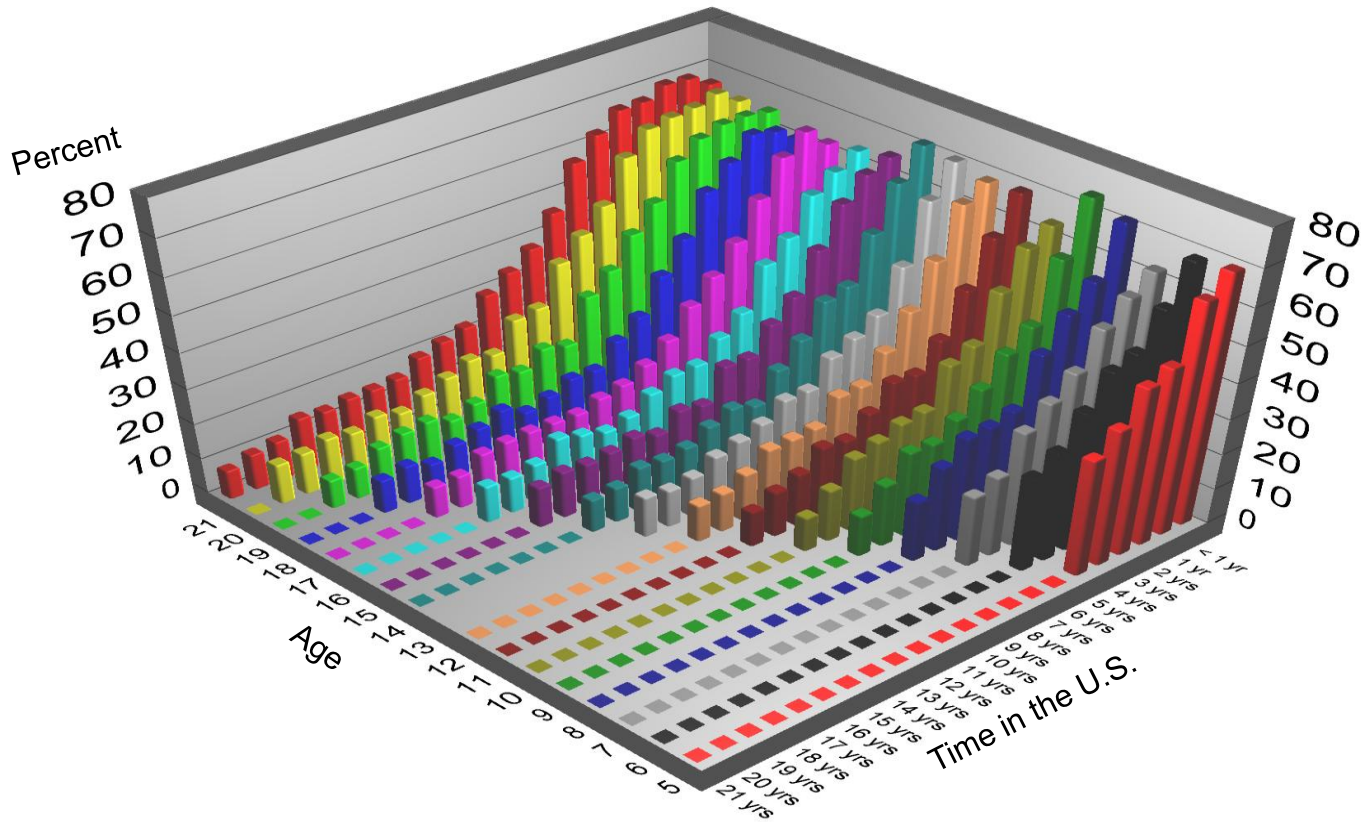


Source: U.S. Census Bureau, 2006-2008 American Community Survey

Note: Graphic excludes native kids

- With increase *time*, LOTE levels go down
- But *age* does not show a clear decline

Figure 4. What proportion of PLOTES speak LTVW?

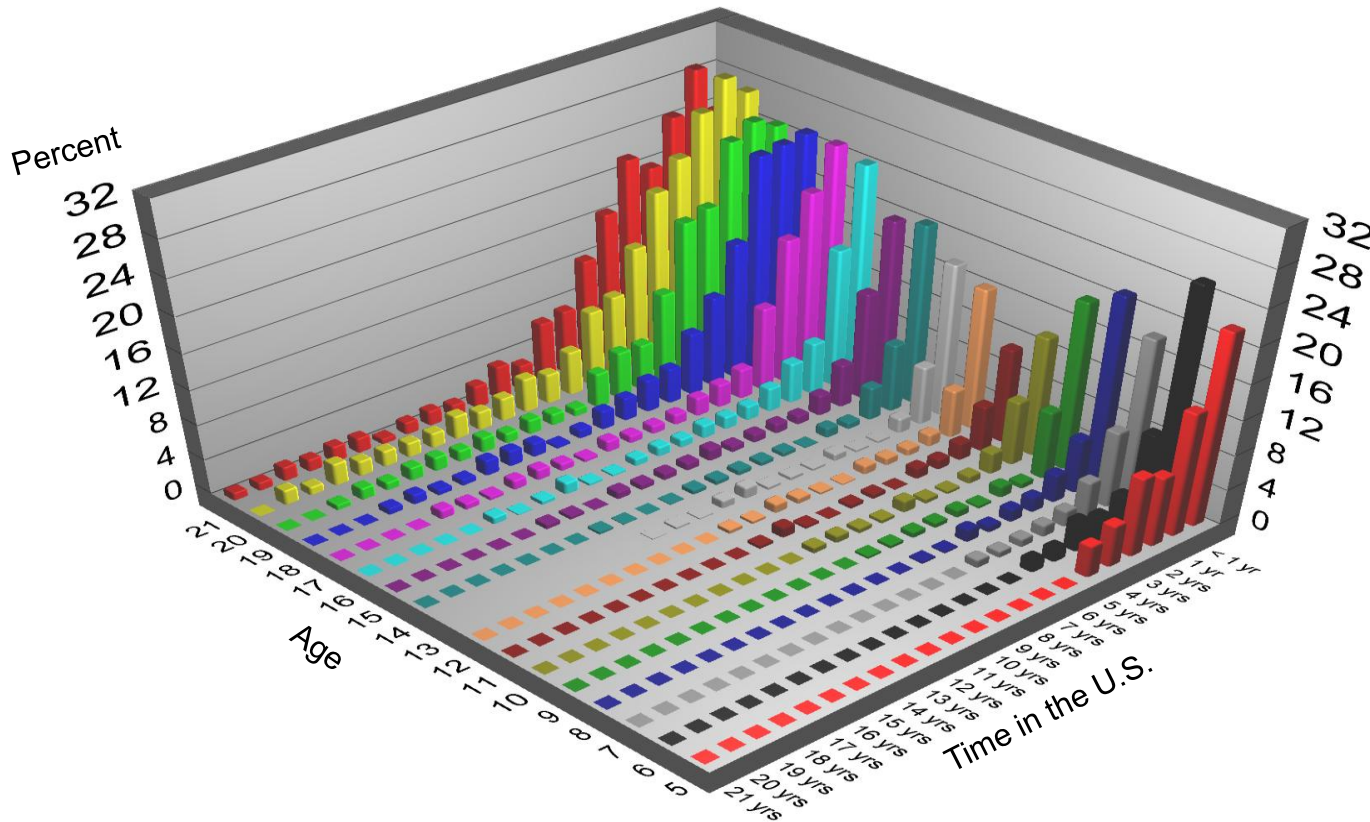


Source: U.S. Census Bureau, 2006-2008 American Community Survey

Note: Graphic excludes native kids

- The dropoff for LTVW is very strong over *time*
- But *age* has no clear relationship

Figure 5. What proportion of PLOTES speak Not At All?



Source: U.S. Census Bureau, 2006-2008 American Community Survey

Note: Graphic excludes native kids

- Again, *time* has strong relationship
- But the pattern by *age* is more U-shaped – higher at the youngest and oldest ages

Summary:

- Because “new” people of various ages come into the U.S. constantly, *age* is more random in looking at levels of speaking a non-English language and levels of English-speaking ability.
- *Time* has a clearer relationship, especially on English-speaking ability measures (LTVW and Not At All)
- “New arrivals” (low duration time) of older ages muddy the relationship

The Pace of Change:

GREEN = AGE EFFECTS

BLUE = TIME EFFECTS

- The green columns shows the average level for each *age*.
- The blue columns shows the “per year change for each amount of *time* in the U.S.”
- The green row shows the average level for each amount of *time* spent in the U.S.
- The blue row shows the “per year change for each *age*.”
- The green box is the average yearly rate of change due to age over all amounts of *time*.
- The blue box is the average yearly rate of change due to time over all *ages*.

What is the pace of change for LOTE?

LOTE	AGE	TIME <																				← AVG OVER AGE (INDEP OF TIME)	← CHANGE RATE OF TIME	
		1 yr	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	6 yrs	7 yrs	8 yrs	9 yrs	10 yrs	11 yrs	12 yrs	13 yrs	14 yrs	15 yrs	16 yrs	17 yrs	18 yrs	19 yrs			20 yrs
21	88.2	89.5	91.7	89.4	89.2	91.5	90.2	87.8	88.6	89.6	83.8	85.7	85.5	83.1	81.8	81.8	77.9	78.4	74.4	63.4	56.2	51.2	81.8	-1.56
20	84.6	89.3	90.4	89.4	92.2	91.3	89.2	87.6	88.3	84.1	85.9	84.4	80.9	82.5	81.1	78.8	74.6	68.8	62.4	55.8	53.4		80.7	-1.55
19	85.6	86.5	90.0	89.3	90.9	89.7	90.9	87.2	90.1	80.4	85.3	86.9	84.0	83.0	79.4	79.1	73.8	65.9	60.3	51.6		81.5	-1.48	
18	85.0	88.6	91.5	92.0	89.8	90.3	89.1	88.0	86.9	88.3	81.9	85.9	83.0	82.6	77.1	75.3	64.3	57.9	54.5			81.7	-1.64	
17	83.3	87.9	91.8	90.1	91.1	89.4	89.6	86.7	87.5	85.0	84.9	85.2	80.8	80.7	75.5	64.7	57.8	54.7				81.5	-1.68	
16	86.1	87.0	87.2	89.4	88.5	87.0	86.1	88.1	87.4	84.5	83.5	80.2	76.1	75.6	66.5	61.0	53.5					80.5	-1.65	
15	90.1	89.5	89.3	89.8	85.7	87.3	88.2	89.5	88.1	81.2	81.5	78.9	75.2	72.1	65.1	53.4						81.6	-1.74	
14	93.8	89.0	90.8	90.4	88.3	86.2	87.5	87.8	87.2	81.0	79.8	76.9	71.1	64.8	54.2							81.9	-1.99	
13	91.7	89.6	85.0	87.4	85.5	87.0	89.1	85.1	83.7	80.9	75.7	71.1	61.4	55.7								80.6	-2.00	
12	87.0	88.0	89.5	89.2	86.7	86.0	88.4	84.3	83.8	81.7	70.7	61.6	55.9									81.0	-2.12	
11	87.4	83.0	86.8	85.8	85.2	83.9	83.2	85.0	79.4	67.7	61.7	55.7										78.7	-2.19	
10	84.1	86.7	86.4	87.0	86.9	85.1	82.0	79.7	74.9	60.8	54.0											78.9	-2.25	
9	87.1	84.2	85.6	85.0	81.9	81.9	79.5	75.5	62.1	54.8												77.8	-2.39	
8	88.3	83.7	86.1	84.6	75.7	79.1	76.9	65.9	56.3													77.4	-2.46	
7	77.5	84.7	88.1	82.9	81.6	75.0	63.0	57.4														76.3	-2.61	
6	84.0	82.1	81.6	76.4	71.8	63.2	54.8															73.4	-3.22	
5	82.9	79.6	73.9	69.6	58.9	54.1																69.8	-3.57	
AVG OVER TIME-->																								
(INDEP OF AGE)		86.3	86.4	87.4	86.3	84.1	82.8	83.0	82.4	81.7	78.5	77.4	77.5	75.4	75.6	72.6	70.6	67.0	65.1	62.9	56.9	54.8	51.2	-1.54
CHANGE RATE OF AGE-->																								
		0.29	0.40	0.60	0.82	1.25	1.67	1.68	1.52	1.89	1.97	2.08	2.28	2.30	2.33	2.69	3.37	3.38					0.51	

Source: U.S. Census Bureau, 2006-2008 American Community Survey

- As Figure 3 shows, there is a 1.5% to 3.6% change for each year of *time* (blue column).
- But the *age* effect actually goes up, not down (green row).
- Older kids entering the U.S. speaking LOTE drives this.

What is the pace of change for LTVW?

	TIME <																					← AVG OVER AGE (INDEF OF TIME)	← CHANGE RATE OF TIME		
	1 yr	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	6 yrs	7 yrs	8 yrs	9 yrs	10 yrs	11 yrs	12 yrs	13 yrs	14 yrs	15 yrs	16 yrs	17 yrs	18 yrs	19 yrs	20 yrs			21 yrs	
AGE	21	66.6	69.9	70.3	67.8	67.7	63.3	57.9	46.4	38.7	34.4	30.4	23.4	21.8	19.8	16.1	15.6	15.6	14.6	15.2	11.1	10.1	8.2	35.7	-2.82
	20	65.0	69.0	67.3	66.8	65.8	60.3	49.5	43.6	38.1	27.7	26.9	19.4	20.3	17.7	15.4	12.8	14.4	12.3	13.4	11.8	11.4		34.7	-2.75
	19	65.1	66.1	66.0	64.2	60.3	51.3	45.0	37.2	32.3	20.7	22.3	18.3	19.6	14.1	11.9	14.2	13.5	12.0	8.9	8.2			32.6	-2.95
	18	61.0	65.0	66.3	61.0	55.3	44.8	36.9	27.7	23.2	17.2	17.4	14.8	13.0	16.1	13.5	11.5	8.6	10.8	9.5				30.2	-3.03
	17	62.8	68.1	63.4	54.4	45.0	37.9	31.9	24.6	20.1	16.8	15.6	13.6	13.8	13.9	13.7	13.0	9.3	9.0					29.3	-3.20
	16	64.0	60.7	56.6	47.3	42.3	31.3	26.6	21.3	21.1	18.3	14.2	12.5	14.3	16.1	11.3	10.2	10.6						28.2	-3.11
	15	65.6	63.2	57.6	47.4	36.9	31.6	24.6	24.8	16.2	17.4	13.0	15.0	13.3	12.7	13.3	11.7							29.0	-3.30
	14	71.7	64.1	52.8	41.0	39.3	31.0	25.1	17.4	19.2	16.7	13.3	12.4	13.2	10.1	9.5								29.1	-3.71
	13	70.7	62.8	47.5	36.7	32.8	29.9	23.0	23.0	18.8	16.6	14.8	11.6	10.7	11.6									29.3	-3.77
	12	68.6	65.1	52.5	41.3	32.7	25.6	25.4	18.8	18.5	18.3	13.9	11.2	10.7										31.0	-4.18
	11	69.2	59.8	48.3	37.2	30.1	30.7	24.4	19.4	20.2	15.2	13.0	10.1											31.5	-4.21
	10	64.1	60.5	51.3	39.4	36.7	26.3	25.6	23.2	21.3	14.9	9.9												33.9	-4.33
	9	74.5	61.1	45.8	40.9	33.9	28.1	23.9	24.3	17.7	11.8													36.2	-4.73
	8	71.6	58.7	52.6	44.5	31.7	30.0	29.7	24.2	17.4														40.0	-4.65
	7	62.6	58.3	52.6	43.4	37.9	32.6	22.8	20.2															41.3	-4.66
	6	68.8	58.9	49.8	47.6	39.3	31.1	26.9																46.1	-4.46
	5	69.7	64.7	49.9	47.4	38.6	33.2																	50.6	-4.34
AVG OVER TIME--> (INDEF OF AGE)		67.2	63.3	55.9	48.7	42.7	36.4	31.2	26.4	23.1	18.9	17.1	14.8	15.1	14.7	13.1	12.7	12.0	11.8	11.7	10.4	10.7	8.2		-2.49
CHANGE RATE OF AGE-->		-0.09	0.48	1.07	1.26	1.62	1.63	1.62	1.39	1.35	1.14	1.30	0.94	1.00	0.72	0.45	0.43	1.01							-0.73

Source: U.S. Census Bureau, 2006-2008 American Community Survey

- As Figure 4 shows, the rate of change over *time* is strong, with an average 2.5% drop for each year of *time* (blue cell).
- But the rate of change for *age* moves around. The average is much smaller than *time* : -0.73% (green row and green cell).

What is the pace of change for Not At All?

Hot at all	TIME <																					← AVG OVER AGE (INDEP OF TIME)	← CHANGE RATE OF TIME		
	1 yr	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	6 yrs	7 yrs	8 yrs	9 yrs	10 yrs	11 yrs	12 yrs	13 yrs	14 yrs	15 yrs	16 yrs	17 yrs	18 yrs	19 yrs	20 yrs			21 yrs	
AGE	21	23.9	29.0	24.7	20.1	21.8	16.7	12.3	7.4	7.0	3.0	3.9	2.6	1.4	1.7	1.4	0.6	1.7	1.8	1.4	1.6	0.9	0.9	8.5	-1.18
	20	27.0	29.2	26.4	22.4	19.5	14.2	9.6	8.8	5.1	3.4	3.9	2.7	2.1	2.7	1.7	1.7	1.8	1.7	2.5	1.0	1.7	9.0	-1.29	
	19	24.6	25.9	24.6	18.3	17.6	10.4	5.4	5.5	4.0	0.9	1.3	1.7	1.2	1.7	1.3	1.6	1.5	0.9	1.3	0.6	7.5	-1.27		
	18	25.0	24.7	24.3	15.6	10.4	7.2	4.0	3.7	2.7	2.2	1.1	0.3	1.6	1.8	1.8	0.7	0.6	1.1	0.8	6.8	-1.32			
	17	25.0	20.8	16.5	9.6	3.4	2.7	2.1	1.2	1.0	0.9	1.3	0.4	0.8	1.3	1.1	0.4	0.7	1.1	5.0	-1.18				
	16	24.2	15.8	6.0	4.6	2.8	1.7	1.5	1.5	1.0	1.1	0.8	0.2	0.3	1.4	0.5	0.1	0.8	3.8	-0.93					
	15	19.5	12.3	5.0	2.4	1.1	1.2	1.0	0.7	1.4	0.9	0.8	0.7	0.9	0.1	0.4	0.6	3.0	-0.79						
	14	20.3	7.8	3.8	0.7	1.2	0.1	0.5	0.5	0.6	0.6	0.5	0.1	0.0	0.1	0.3	2.5	-0.75							
	13	17.4	6.7	1.7	0.3	0.3	0.8	0.3	0.4	0.3	1.3	0.9	0.1	0.2	0.1	2.2	-0.65								
	12	16.1	5.5	1.4	0.9	0.9	1.0	0.2	0.3	0.7	1.1	0.3	0.4	0.0	2.2	-0.62									
	11	10.8	5.2	2.0	1.2	1.3	0.1	0.5	0.4	0.0	0.3	1.2	0.4	2.0	-0.49										
	10	13.7	7.4	2.5	0.9	0.3	0.5	1.4	0.4	0.5	0.8	0.7	2.6	-0.72											
	9	19.1	7.8	0.7	1.3	0.3	0.9	0.6	0.6	0.4	0.3	3.2	-0.97												
	8	21.2	6.2	3.2	1.7	1.5	0.7	1.5	0.2	0.2	4.0	-1.19													
	7	18.0	8.7	4.0	1.8	1.3	0.9	0.7	0.9	4.6	-1.34														
	6	25.3	10.0	4.2	3.0	3.6	1.6	1.5	7.0	-1.82															
	5	21.8	14.1	8.0	9.1	4.8	3.7	10.3	-1.76																
AVG OVER TIME--> (INDEP OF AGE)	20.8	13.9	9.4	6.7	5.4	3.8	2.7	2.2	1.8	1.3	1.4	0.9	0.9	1.2	1.1	0.8	1.2	1.3	1.5	1.1	1.3	0.9	-0.65		
CHANGE RATE OF AGE-->	0.22	1.07	1.24	0.97	1.02	0.73	0.52	0.48	0.38	0.17	0.21	0.20	0.17	0.25	0.16	0.16	0.19	0.06							

Source: U.S. Census Bureau, 2006-2008 American Community Survey

- In Figure 5, *time* impact varies in a U-shaped form (blue cell).
- The rate of change across *age* is variable and small overall (green cell).

Regression Approach:

- Attempt to model directly the effects of *age* and *time* in the U.S.
- While both *age* and *time* are interval variables, previous analysis indicates they may not behave in a linear fashion.
- Models run with both linear and with single-*age* and *time* dummies indicate slightly better fit for latter approach.

Figure 6. Effects of Age and Time on LOTE

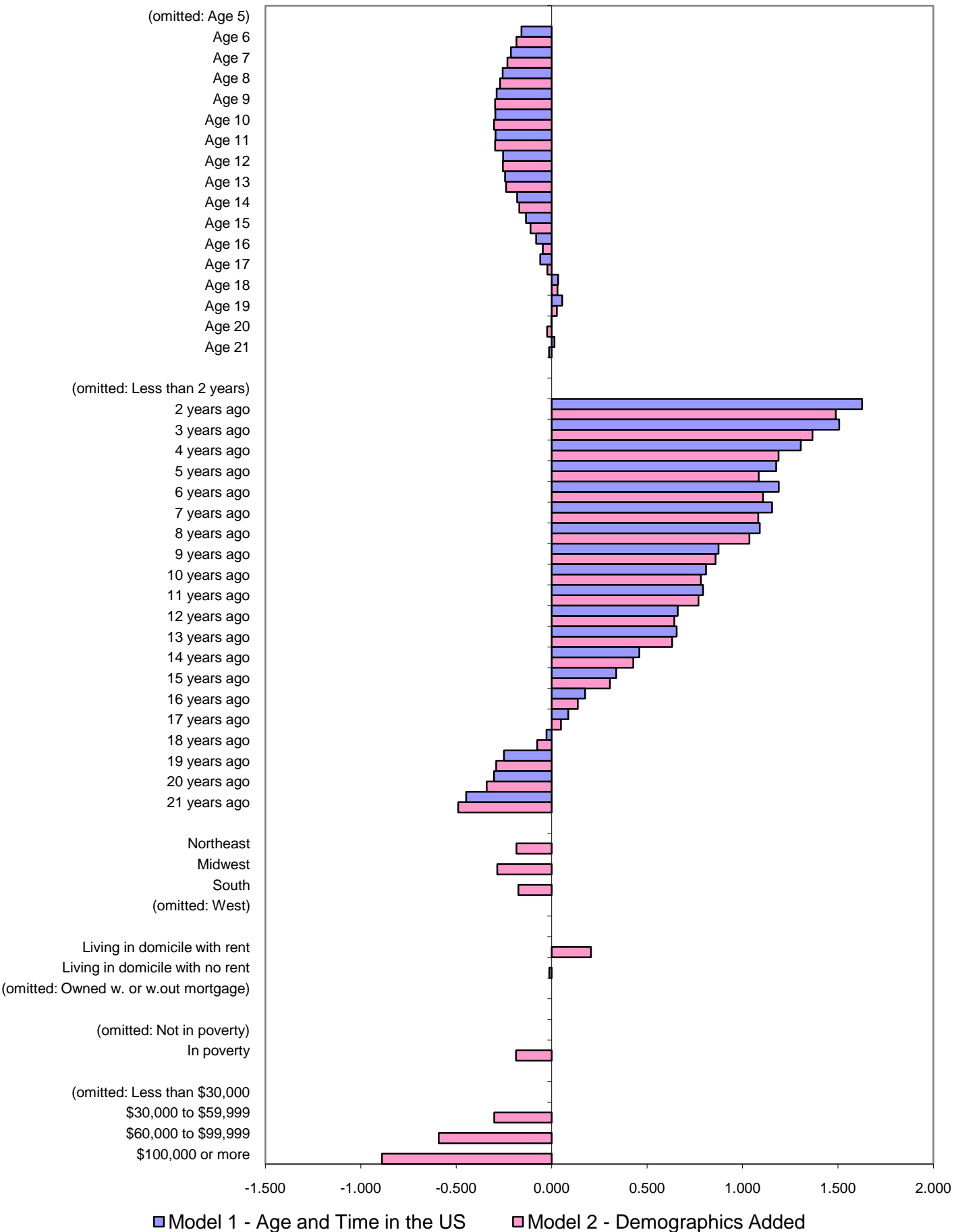


Figure 7. Effects of Age and Time on LTVW

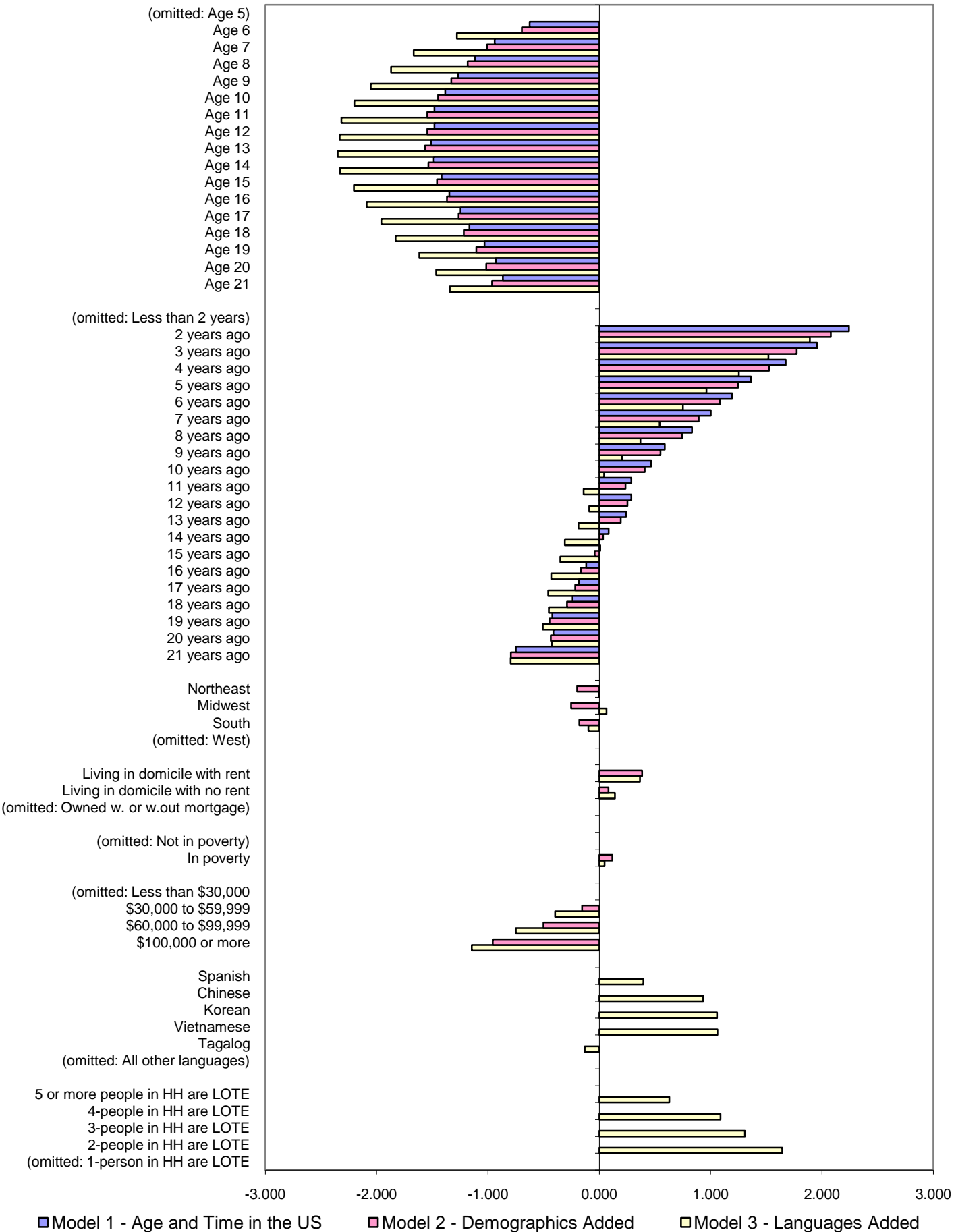
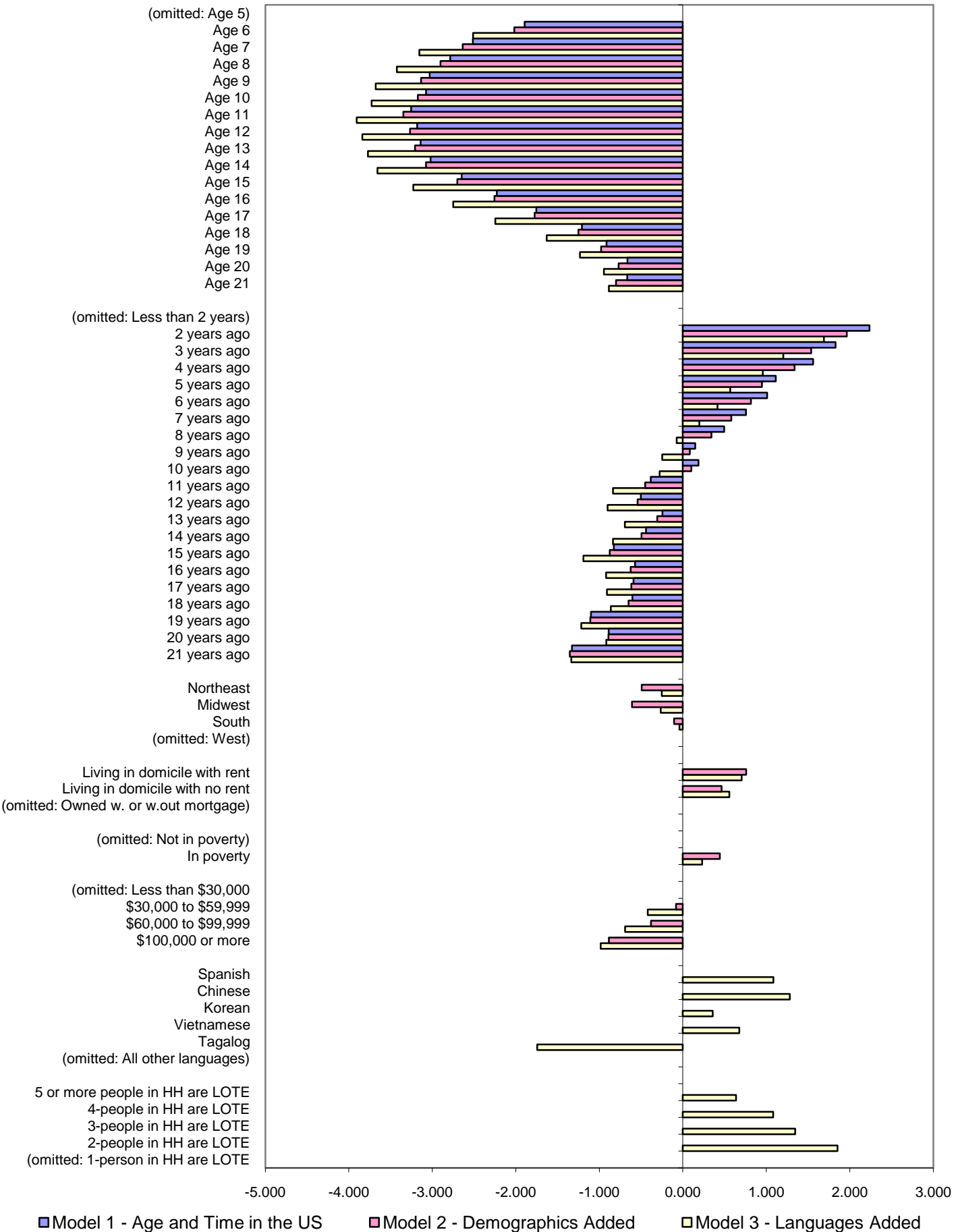


Figure 8. Effects of Age and Time on Not At All



Modeling LOTE Speakers:

- Figure 6 shows the effects of *age* and *time*, along with selected factors, on the likelihood of speaking LOTE.
- The *time* effect shows a somewhat orderly pattern (each year of *time* decreases the likelihood of speaking LOTE), but *age*, after initially falling, starts to rise, thus raising the likelihood of being LOTE with increasing age.
- Other socio-demographic factors (pink bars), such as region, tenure, poverty status, and household income, have effects of their own, but the basic pattern of effects for *time* and *age* stay about the same.

Modeling Speaking English LTVW:

- Figure 7 models the likelihood of speaking English less than “very well.”
- While *age* has a much stronger effect than in the LOTE model, the pattern of both the *age* and *time* effects are similar to those in the LOTE analysis.
- Adding socio-demographics (pink bars) impacts parameters but not the basic *age* and *time* patterns.
- Adding specific languages (yellow bars) sizably changes the *age* and *time* effects, but not the basic patterns.

Modeling Speaking English NAA:

- Figure 8 models the likelihood of speaking English “not at all.”
- Again, the basic patterns for *age* and *time* are similar to those for the LOTE and LTVW analyses.
- Adding socio-demographics (pink bars) changes some parameters but not the basic pattern.
- Adding specific languages (yellow bars) increases some *age* effects sizably (especially at younger ages).
- The *age* pattern resembles earlier models, the *time* pattern starts breaking down at longer *time* durations.
- At least one language (Tagalog) sizably reduces the likelihood of speaking English NAA.

Conclusion:

- Both *age* and *time* in the U.S. have strong impacts on English language use and English-speaking ability.
- Time effects border on being linear, but *age* effects are not.
- The in-migration of older persons (teenagers and young adults) keep *age* from having a simple linear effect.
- Other factors, including the specific language, also have sizable effects.