

# The Value of Season of Birth and Fertility Timing

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# Motivation

- ▶ Season of birth relevant for birth quality and long-term outcomes:
  - ▶ child health, educational attainment, labor market
  - ▶ Buckles and Hungerman (2013)
  - ▶ Crawford et al. (2014)
  - ▶ Currie and Schwandt (2013)
- ▶ Although no consensus yet on the main driving force:
  - ▶ selection (of mothers), school entry rules, weather in last term (winter)
- ▶ The *effects* of the season of birth are clear: there are “good” and “bad” seasons

# Motivation

Winter months are bad: quarters 1 and 4, Spring and Summer are good (quarters 2 and 3), at least in the US

However,

- ▶ No analysis of the *determinants* of the season of birth of a child
- We consider the choice of season of birth

Fertility planning and season of first birth:

- ▶ When to have the first child and in which season?
- ▶ Focus on SOB decision, take age of mother as given

# What do we do?

1. Correlates of season of birth with mothers' attributes
2. Correlates of season of birth with child quality
3. Use gestation weeks to further disentangle the expected from the realized good and bad seasons
4. Age is the most important determinant of SOB
5. Why? Preferences and/or biological constraints?
6. Estimate value of SOB in terms of birth quality
7. Value of SOB and postponing fertility, trade-off:
  - ▶ Postpone: earnings increase but less good season
  - ▶ Not postpone: earnings decrease but good season

# How do we do it?

- ▶ US and Spain: birth certificates
- ▶ Reduced-form estimates of season of birth, also by smoking during pregnancy and ART use
- ▶ Reduced-form estimates of birth quality, season of birth, also by mother's attributes
- ▶ Bare-bones model:
  - ▶ two types of women, young and old
  - ▶ SOB is choice variable
- ▶ Structural model: work in progress, to assess the value of SOB, importance of biological and economic constraints
  - ▶ Two endogenous variables: age and SOB

# Data Description

- ▶ US National Vital Statistics System: all birth certificates
- ▶ Detailed information on “birth quality” and mothers’ characteristics
- ▶ We focus on:
  - ▶ White and non-Hispanic women who had their first-born child
  - ▶ Singletons (we also look at twins)
  - ▶ Mothers aged 25-45
  - ▶ 2005-2013

**Table 1 : Descriptive Statistics (NVSS 2005-2013)**

	N	Mean	Std. Dev.	Min.	Max.
<b>Panel A: Mother</b>					
Mother's Age	4863864	30.24	4.06	25	45
Young (aged 25-39)	4863864	0.97	0.17	0	1
Married	4863864	0.84	0.36	0	1
Some College +	3181962	0.87	0.33	0	1
Years of education	3181962	15.33	1.76	4	17
Smoked during Pregnancy	2813344	0.06	0.25	0	1
Used ART (2012-2013 only)	982705	0.04	0.20	0	1
<b>Panel B: Child</b>					
Good season of birth	4863864	0.51	0.50	0	1
Birthweight (grams)	4849898	3309.42	574.87	500	5000
Low Birth Weight (<2500 g)	4849898	0.07	0.26	0	1
Weeks of Gestation	4859056	38.85	2.41	17	47
Premature (< 37 weeks)	4859056	0.10	0.31	0	1
APGAR (0-10)	4752668	8.79	0.81	0	10
Twin	4863864	0.03	0.17	0	1
Female	4863864	0.49	0.50	0	1
NOTES: Each sample consists of all first-born children born to white, non-hispanic, US-born mothers. Good season refers to birth quarters 2 and 3 (Apr-Jun and Jul-Sept).					

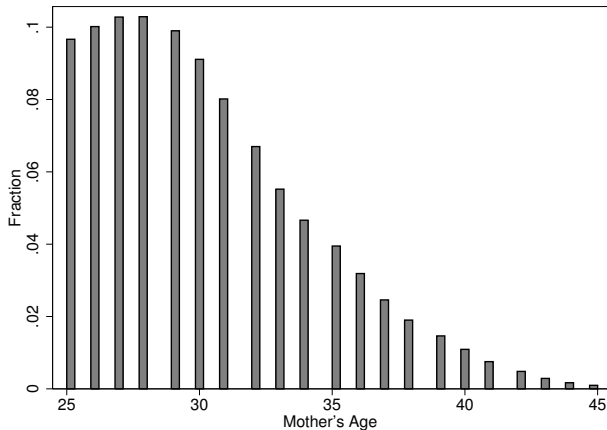
Table 2 : Percent of Births, Singletons

	Seasons				Characteristics	
	Bad Season	Good Season	Diff.	Ratio	< 37 weeks	ART
PANEL A: BY AGE GROUPS						
Young	48.43	51.57	3.14	1.06	0.09	0.03
Old	50.2	49.8	-0.4	0.99	0.13	0.14
PANEL B: BY EDUCATION						
No College	49.44	50.56	1.12	1.02	0.11	0.01
Some College +	48.34	51.66	3.32	1.07	0.08	0.03
PANEL C: BY AGE AND EDUCATION						
Young No College	49.43	50.57	1.14	1.02	0.11	0.01
Young Some College +	48.28	51.72	3.44	1.07	0.08	0.03
Old No College	49.84	50.16	0.32	1.01	0.17	0.06
Old Some College +	50.24	49.76	-0.4	0.99	0.12	0.15



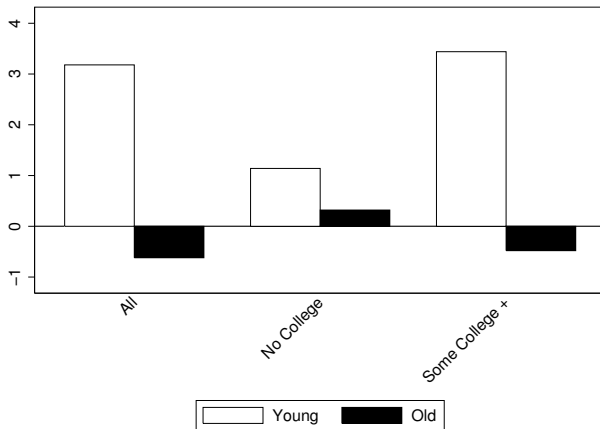
# Maternal Age at Birth: USA

Figure 1 : Mother's Age at First Birth, 25-45



# Maternal Age at Birth: USA

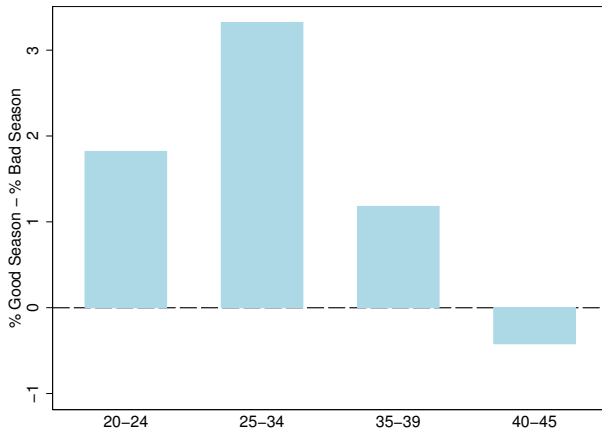
Figure 2 : Difference in Births (% Good Season - % Bad Season)



Note: 'Young' refers to 25-39. 'Old' refers to 40-45.

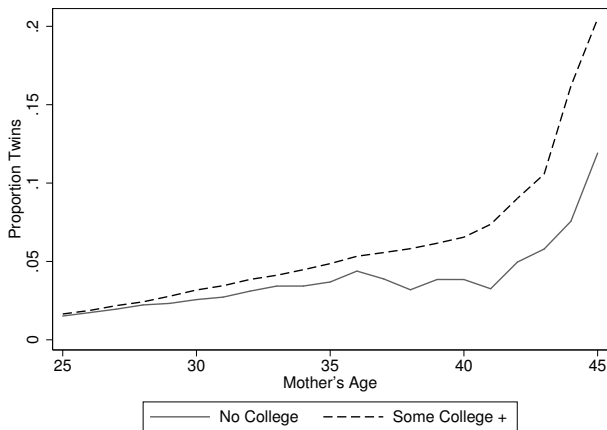
# Maternal Age at Birth: USA

Figure 3 : Difference in Births (% Good Season - % Bad Season)



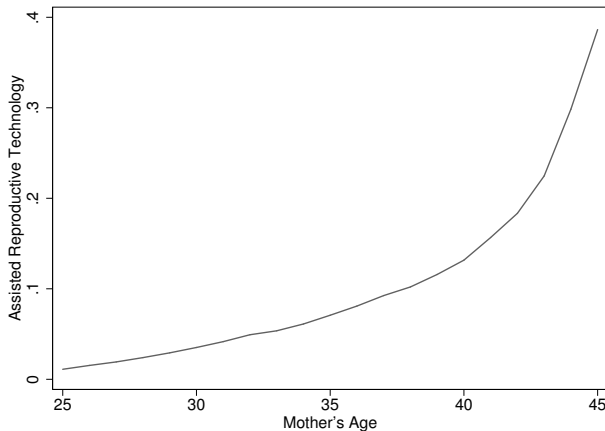
# Twin Prevalance and Age

Figure 4 : Proportion of Twins Born by Age



# Assisted Reproductive Technology and Age

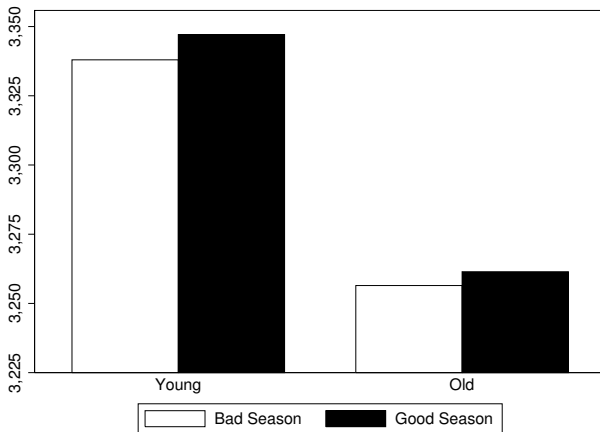
Figure 5 : Proportion of Mothers Reporting any ART



Notes: Questions on ART use are only included in 2012-2013 birth certificate data.

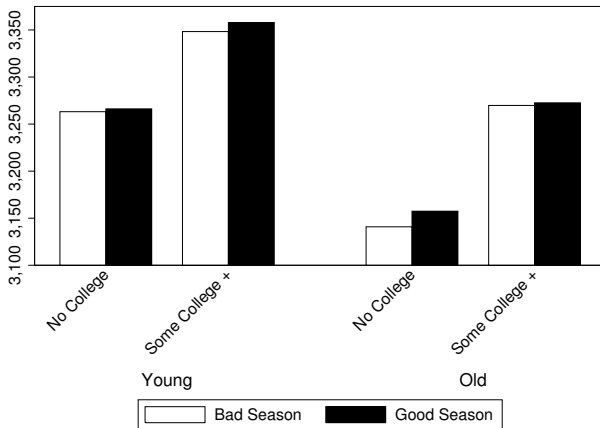
# Birth Quality by Season

Figure 6 : Child quality: Birthweight (grams)



# Birth Quality by Season

Figure 7 : Child quality: Birthweight by Education



# Season of Birth, Age and Education

Table 3 : Birth Season and Age

	(1) Good Season	(2) Good Season	(3) Good Season	(4) Good Season
Aged 25-39	0.019*** [0.001]	0.019*** [0.001]	0.018*** [0.002]	0.018*** [0.002]
Some College +			0.011*** [0.001]	0.008*** [0.001]
Married				0.008*** [0.001]
Smoked in Preg				-0.008*** [0.001]
Constant	0.497*** [0.001]	0.497*** [0.002]	0.488*** [0.002]	0.486*** [0.003]
Observations	4711449	4711449	3079418	2708385
Year FE		Y	Y	Y



# Season of Birth, Age and Education

Table 4 : Birth Season and Age: Alternative Samples and Definitions

DEP VAR:	(1)	(2)	(3)	(4)	(5)	(6)
Good Season		Smoked During Preg			Assisted Reproductive Technology	
	All	Non-Smoker	Smoker	2012-2013	No	Yes
Aged 25-39	0.018*** [0.002]	0.019*** [0.002]	-0.006 [0.009]	0.020*** [0.003]	0.019*** [0.004]	0.007 [0.009]
Some College +	0.008*** [0.001]	0.010*** [0.001]	0.004 [0.002]	0.006*** [0.002]	0.006*** [0.002]	0.006 [0.013]
Married	0.008*** [0.001]			0.010*** [0.001]	0.011*** [0.001]	-0.003 [0.011]
Smoked in Preg	-0.008*** [0.001]			-0.008*** [0.002]	-0.008*** [0.002]	0.019 [0.027]
Constant	0.486*** [0.003]	0.489*** [0.003]	0.515*** [0.010]	0.484*** [0.004]	0.485*** [0.004]	0.483*** [0.018]
Observations	2708385	2531015	177370	897785	867105	29350

# Season of Birth, Age and Education

Table 5 : Birth Season and Age

	(1) Good Season	(2) Good Season	(3) Good Season	(4) Good Season
Aged 25-39	0.019*** [0.001]	0.018*** [0.002]	0.004 [0.005]	0.004 [0.006]
Some College +		0.011*** [0.001]	-0.004 [0.006]	-0.007 [0.006]
College× Aged 25-39			0.016*** [0.006]	0.016** [0.006]
Married				0.008*** [0.001]
Smoked in Preg				-0.008*** [0.001]
Constant	0.497*** [0.002]	0.488*** [0.002]	0.501*** [0.005]	0.500*** [0.006]
Observations	4711449	3079418	3079418	2708385
Year FE	Y	Y	Y	Y

# Season of Birth, Age and Education

Table 6 : Birth Season and Age (Young=25-34)

	(1) Good Season	(2) Good Season	(3) Good Season	(4) Good Season
Aged 25-34	0.011*** [0.001]	0.011*** [0.001]	0.012*** [0.001]	0.012*** [0.001]
Some College +			0.011*** [0.001]	0.008*** [0.001]
Married				0.008*** [0.001]
Smoked in Preg				-0.008*** [0.001]
Constant	0.506*** [0.001]	0.506*** [0.001]	0.495*** [0.002]	0.493*** [0.002]
Observations	4711449	4711449	3079418	2708385
Year FE		Y	Y	Y

# Misclassification of good season choice?

- ▶ Choose the expected season of birth, but then there is the realized one:
  - ▶ If pre-term, birth may end up in the “wrong” season
- ▶ Using gestation weeks, construct 4 dummies of good and bad seasons:
  1. good-good
  2. good-bad
  3. bad-good
  4. bad-bad
- ▶ Observed difference between young and old: is it different choice, or olders' SOB are driven by pre-term unexpected quarter?

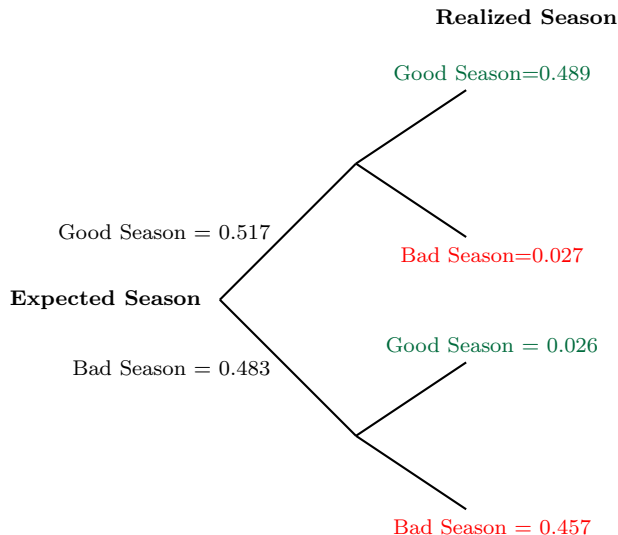
# Season of Birth, Age and Education (Multinomial Logit)

Table 7 : Birth Season Predictors (Multinomial Logit)

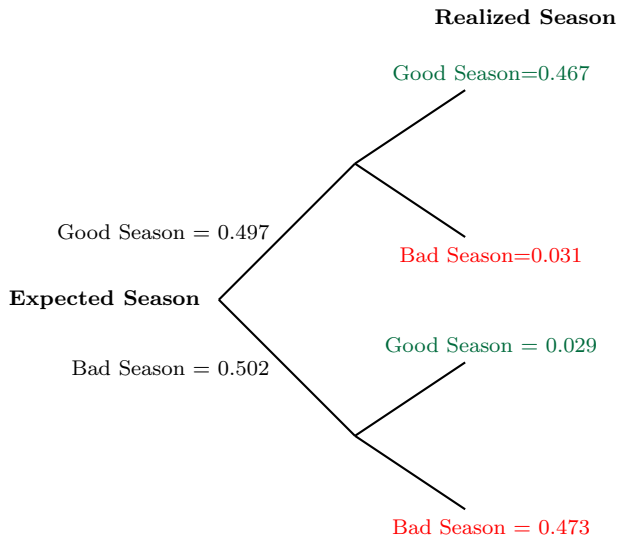
	(1) Due Good, Born Bad	(2) Due Bad, Born Good	(3) Due Bad, Born Bad
Aged 25-39	-0.002*** [0.001]	-0.001 [0.001]	-0.016*** [0.002]
Some College +	-0.002*** [0.000]	-0.002*** [0.000]	-0.005*** [0.001]
Married	-0.003*** [0.000]	-0.003*** [0.000]	-0.005*** [0.001]
Smoked during Preg	0.002*** [0.000]	0.003*** [0.000]	0.006*** [0.001]
Observations	2706668	2706668	2706668

Estimated average marginal effects are reported. Standard errors for marginal effects are calculated using the delta method. Year fixed effects included (not reported). Expected in good and born in good is the omitted base outcome.

# Conception and Births: YOUNG



# Conception and Births: OLD



# Birth Quality

Table 8 : Birth Quality by Age and Season

	(1) Birthweight	(2) LBW	(3) VLBW	(4) Gestation	(5) Premature	(6) APGAR
Aged 25-39	85.043*** [2.237]	-0.033*** [0.001]	-0.006*** [0.000]	0.450*** [0.009]	-0.042*** [0.001]	0.036*** [0.003]
Bad Season	-8.052*** [0.659]	0.001*** [0.000]	0.000*** [0.000]	-0.023*** [0.003]	0.002*** [0.000]	-0.002 [0.001]
Some College +	51.271*** [1.113]	-0.019*** [0.001]	-0.005*** [0.000]	0.166*** [0.005]	-0.019*** [0.001]	0.042*** [0.002]
Married	32.808*** [0.985]	-0.012*** [0.000]	-0.003*** [0.000]	0.083*** [0.004]	-0.015*** [0.001]	0.022*** [0.002]
Smoked in Preg	-177.596*** [1.532]	0.048*** [0.001]	0.005*** [0.000]	-0.203*** [0.007]	0.026*** [0.001]	-0.033*** [0.002]
Constant	3206.093*** [2.960]	0.115*** [0.001]	0.023*** [0.001]	38.208*** [0.012]	0.170*** [0.002]	8.690*** [0.005]
Observations	2701381	2701381	2701381	2706668	2706668	2693737



# Birth Quality

Table 9 : Birth Quality and Age: Alternative Samples and Definitions

DEP VAR: Birthweight	(1)	(2)	(3)	(4)	(5)	(6)
	All	Smoked During Pregnancy			Assisted Reproductive Tech.	
		Non-Smoker	Smoker	2012-2013	No	Yes
Aged 25-39	85.043*** [2.237]	82.130*** [2.273]	168.683*** [11.060]	95.532*** [3.962]	97.450*** [4.252]	32.451*** [11.497]
Bad Season	-8.052*** [0.659]	-9.280*** [0.676]	4.345 [2.812]	-7.176*** [1.139]	-6.995*** [1.154]	-5.390 [7.037]
Some College +	51.271*** [1.113]			52.982*** [1.999]	53.942*** [2.014]	21.959 [16.884]
Married	32.808*** [0.985]			32.259*** [1.647]	34.976*** [1.661]	-47.082*** [13.701]
Smoked in Preg	-177.596*** [1.532]			-189.610*** [2.810]	-190.011*** [2.824]	-179.460*** [32.112]
Constant	3206.093*** [2.960]	3284.507*** [2.759]	2984.955*** [12.310]	3192.797*** [4.516]	3190.242*** [4.774]	3280.025*** [23.092]
Observations	2701381	2537124	177383	895471	864892	29258

# Birth Quality

Table 10 : Birth Quality by Age and Season

DEP VAR: Birthweight	(1)	(2)	(3)	(4)	(5)	(6)
	All		Young		Old	
	No Gest. Controls	Gestation Controls	No Gest. Controls	Gestation Controls	No Gest. Controls	Gestation Controls
Aged 25-39	84.523*** [2.216]	25.747*** [1.774]				
Bad Season (due good)	-224.843*** [3.272]	-2.552 [2.055]	-220.164*** [3.308]	-2.946 [2.080]	-384.741*** [21.182]	10.550 [13.318]
Good Season (due bad)	-251.008*** [3.442]	-10.893*** [2.090]	-245.748*** [3.475]	-10.821*** [2.114]	-435.606*** [23.302]	-12.171 [13.611]
Bad Season (due bad)	-8.350*** [0.646]	-5.415*** [0.554]	-8.409*** [0.654]	-5.361*** [0.560]	-7.244* [4.288]	-7.561** [3.562]
Some College +	50.246*** [1.105]	24.121*** [0.903]	49.527*** [1.115]	24.081*** [0.913]	80.304*** [7.996]	28.225*** [6.271]
Married	31.236*** [0.979]	13.996*** [0.803]	31.491*** [0.994]	13.806*** [0.817]	28.737*** [5.589]	20.999*** [4.406]
Smoked in Preg	-176.119*** [1.521]	-141.871*** [1.252]	-174.471*** [1.534]	-140.954*** [1.263]	-253.512*** [11.404]	-187.938*** [9.516]
Constant	3220.505*** [2.932]	786.590*** [51.080]	3305.071*** [2.004]	3348.785*** [1.646]	3213.930*** [13.419]	3253.718*** [10.737]
R-squared	0.02	0.33	0.02	0.33	0.04	0.38
Observations	2699834	2699834	2627359	2627359	72475	72475

Even numbered columns include fixed effects for weeks of gestation.

Table 11 : Descriptive Statistics (Spain 2013)

	N	Mean	Std. Dev.	Min.	Max.
<b>Panel A: Mother</b>					
Mother's Age	160590	32.63	4.04	25	45
Young (aged 25-39)	160590	0.94	0.23	0	1
Married	160590	0.55	0.50	0	1
Some College +	160590	0.55	0.50	0	1
Years of education	149124	12.83	3.63	0	17
White Collar Job	158032	0.62	0.49	0	1
<b>Panel B: Child</b>					
Good Season	160590	0.50	0.50	0	1
Birthweight	153686	3196.50	499.86	500	5000
Low Birth Weight (<2500 g)	153686	0.07	0.25	0	1
Gestation	139379	39.21	1.81	21	46
Premature (<37 weeks)	160590	0.06	0.23	0	1
Female	160590	0.48	0.50	0	1
Cesarean	160590	0.30	0.46	0	1
NOTES: Sample consists of all singleton first-born children of Spanish mothers. Good season refers to birth quarters 2 and 3 (Apr-Jun and Jul-Sept).					

Table 12 : Percent of Births, Singletons

	Bad Season	Good Season	Diff.	Ratio	Premature (<37 weeks)
PANEL A: BY AGE GROUPS					
Young	49.58	50.42	0.84	1.02	0.056
Old	51.63	48.37	-3.2	0.94	0.075
PANEL B: BY EDUCATION					
No College	49.87	50.13	0.26	1.01	0.061
Some College +	49.55	50.45	0.90	1.02	0.054
PANEL C: BY AGE AND EDUCATION					
Young No College	49.83	50.17	0.34	1.01	0.059
Young Some College +	49.37	50.63	1.26	1.03	0.052
Old No College	50.56	49.44	-1.1	0.98	0.075
Old Some College +	52.41	47.59	-4.8	0.91	0.074
NOTES: Good season refers to birth quarters 2 and 3 (Apr-Jun and Jul-Sept). Bad season refers to quarters 1 and 4 (Jan-Mar and Oct-Dec). Values reflect the percent of yearly births from each season in 2013. 'Young' refers to 25-39 year olds, 'Old' refers to 40-45 year olds.					

# Season of Birth, Age and Education (Spain)

Table 13 : Birth Season and Age (Spain 2013)

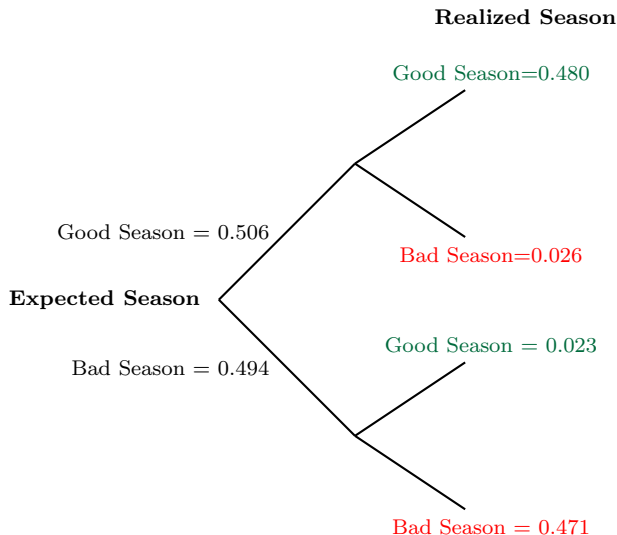
	(1) Good Season	(2) Good Season	(3) Good Season	(4) Good Season	(5) Good Season
Aged 25-39	0.021*** [0.005]	0.021*** [0.005]	0.021*** [0.005]	0.021*** [0.006]	0.020*** [0.006]
Some College +			0.002 [0.003]	0.002 [0.003]	0.001 [0.003]
White Collar Job				0.001 [0.003]	-0.000 [0.003]
Married					0.013*** [0.003]
Constant	0.484*** [0.005]	0.491*** [0.016]	0.490*** [0.017]	0.491*** [0.017]	0.486*** [0.017]
R-squared	0.00	0.00	0.00	0.00	0.00
Observations	160516	160516	160516	157958	157958
Province FE		Y	Y	Y	Y

# Birth Quality (Spain)

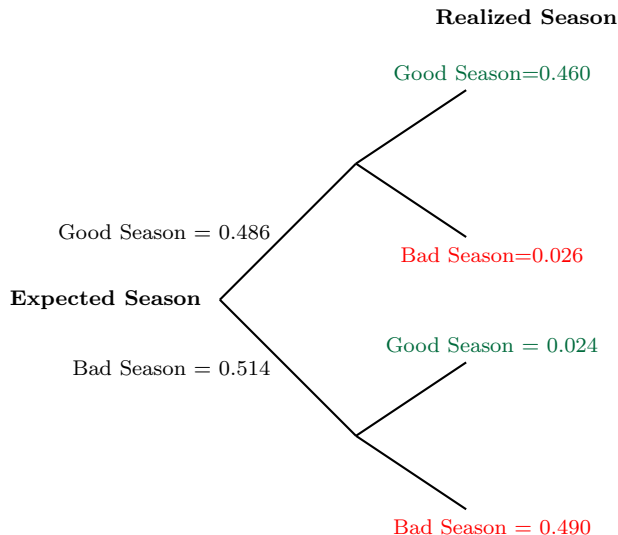
Table 14 : Birth Quality by Age and Season (Spain 2013)

	(1) Birthweight	(2) Gestation	(3) LBW	(4) Premature	(5) VLBW	(6) Cesarean
Aged 25-39	37.041*** [6.187]	0.195*** [0.024]	-0.024*** [0.003]	-0.019*** [0.003]	-0.006*** [0.001]	-0.166*** [0.005]
Bad Season	-8.339*** [2.556]	-0.023** [0.010]	0.001 [0.001]	0.001 [0.001]	0.000 [0.000]	0.007*** [0.002]
Some College +	26.953*** [3.040]	0.067*** [0.011]	-0.013*** [0.002]	-0.005*** [0.001]	-0.001 [0.001]	-0.013*** [0.003]
White Collar Job	8.416*** [3.127]	-0.010 [0.012]	-0.006*** [0.002]	-0.003** [0.001]	-0.000 [0.001]	-0.001 [0.003]
Married	17.300*** [2.639]	-0.055*** [0.010]	-0.005*** [0.001]	-0.002 [0.001]	-0.001 [0.000]	0.013*** [0.002]
Constant	3127.008*** [16.539]	39.099*** [0.057]	0.100*** [0.008]	0.073*** [0.007]	0.014*** [0.003]	0.322*** [0.013]
R-squared	0.00	0.00	0.00	0.00	0.00	0.02
Observations	151802	137569	151802	157958	151802	157958

# Conception and Births: YOUNG (Spain)



# Conception and Births: OLD (Spain)





# Birth Quality (Spain)

Table 15 : Birth Quality by Age and Season (Spain)

DEP VAR: Birthweight	(1)	(2)	(3)	(4)	(5)	(6)
	All		Young		Old	
	No Gest. Controls	Gestation Controls	No Gest. Controls	Gestation Controls	No Gest. Controls	Gestation Controls
Aged 25-39	39.428*** [6.560]	6.794 [5.212]				
Bad Season (due in good)	-35.439*** [12.482]	-2.073 [7.951]	-31.015** [12.681]	-2.371 [8.107]	-114.334* [63.661]	-10.601 [38.499]
Good Season (due in bad)	-89.339*** [13.754]	-15.116* [8.332]	-86.289*** [14.024]	-12.607 [8.531]	-140.779** [66.596]	-57.077 [38.371]
Bad Season (due in bad)	-11.332*** [2.694]	-5.482** [2.274]	-10.794*** [2.756]	-4.777** [2.330]	-20.685 [12.640]	-17.977* [10.372]
Some College +	28.203*** [3.227]	16.308*** [2.652]	29.391*** [3.307]	17.073*** [2.723]	8.759 [14.598]	3.869 [11.645]
White Collar Job	2.559 [3.291]	4.110 [2.704]	1.392 [3.363]	3.236 [2.769]	21.981 [15.801]	18.042 [12.540]
Married	13.790*** [2.763]	20.730*** [2.263]	14.726*** [2.826]	21.596*** [2.320]	-2.419 [12.864]	6.741 [10.160]
Constant	3143.833*** [6.981]	3171.513*** [5.589]	3182.344*** [3.116]	3179.267*** [2.605]	3157.791*** [14.958]	3153.201*** [12.006]
R-squared	0.00	0.33	0.00	0.33	0.00	0.37
Observations	134985	134985	127718	127718	7267	7267

Even numbered columns include fixed effects for weeks of gestation.

# Directions

- ▶ Estimation of payoffs of season of birth
- ▶ Value of season of birth measured by birth weight, for young and old women
- ▶ Value of SOB and postponing fertility
- ▶ Structural model

# Appendix

# Bare-bones model

- ▶ There are two seasons of birth (and two periods):
  - ▶ First, Bad Season:  $Q4(t-1)$  ,  $Q1(t)$
  - ▶ Second, Good Season:  $Q2(t)$  ,  $Q3(t)$

$Q4(t-1)$	$Q1(t)$	$Q2(t)$	$Q3(t)$
BAD SEASON		GOOD SEASON	

- ▶ There are two types of women: Young (25-39) and Old (40-45)
- ▶ The probability of having a child is higher for young than old women:  $p^Y > p^O$
- ▶ The *biological* (average) quality of the child is higher in the good season than in the bad season:  $\mu_{BAD}^\tau \leq \mu_{GOOD}^\tau$  (e.g., birth weight), where  $\tau = \{Y, O\}$ .
- ▶ There are *no unwanted pregnancies*
- ▶ Women want to maximize the expected biological quality of their child
- ▶ *Both* types of women are *risk neutral*
- ▶ Each type of woman can play two lotteries: Bad Season or Good Season.

# Bare-bones model

- ▶ If a woman goes for the first season, and she is unsuccessful, she has a second chance in the good season.
- ▶ If a woman goes for the second season, and she is unsuccessful, she has no second chance!
- ▶ The expected payoff for a young woman when going for the **bad season** is

$$p^Y \mu_{BAD}^Y + (1 - p^Y) p^Y \mu_{GOOD}^Y$$

- ▶ The expected payoff for a young woman when going for the **good season** is

$$p^Y \mu_{GOOD}^Y$$

- ▶ A young woman goes for the good season if and only if

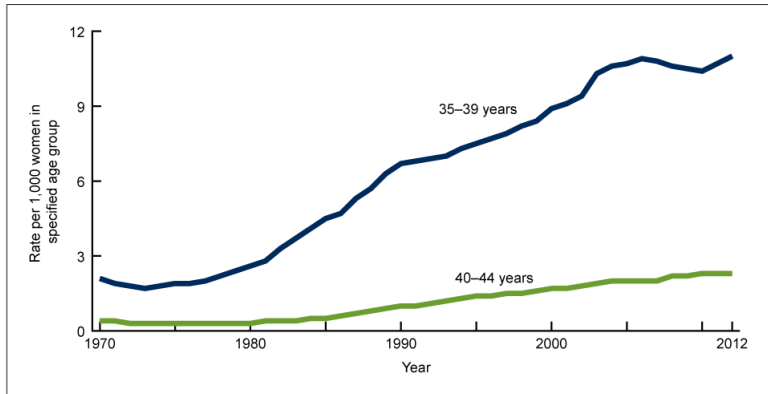
$$p^Y \mu_{GOOD}^Y \geq \mu_{BAD}^Y$$

- ▶ By the same token, an old woman goes for the bad season if and only if

$$p^O \mu_{GOOD}^O \geq \mu_{BAD}^O$$

# First Birth Rates by Mother's Age: 35-39 vs. 40-44

Figure 1. First birth rates by selected age of mother: United States, 1970–2012

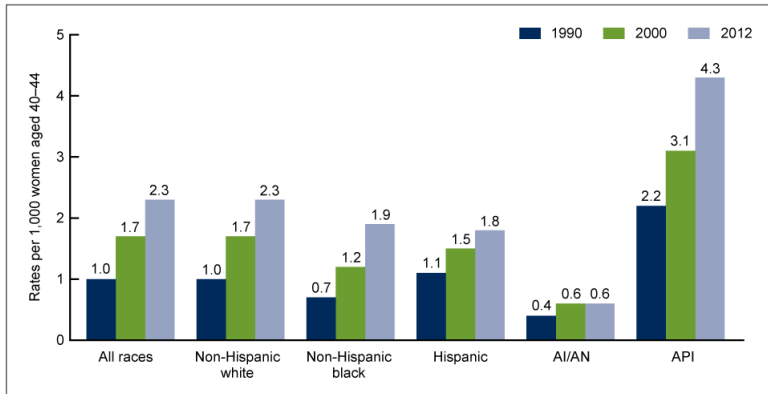


NOTE: Access data table for Figure 1 at: [http://www.cdc.gov/nchs/data/databriefs/db152\\_table.pdf#1](http://www.cdc.gov/nchs/data/databriefs/db152_table.pdf#1).

SOURCE: CDC/NCHS, National Vital Statistics System.

# First Birth for Mother's Age 40-44 by Race and Ethnicity

Figure 3. First birth rates for women aged 40–44 years, by race and Hispanic origin: United States, 1990, 2000, and 2012



SOURCE: CDC/NCHS, National Vital Statistics System.

# Season of Birth, Age and Education (Birth Order=2)

Table 16 : Birth Season and Age

	(1) Good Season	(2) Good Season	(3) Good Season	(4) Good Season
Aged 25-39	0.021*** [0.001]	0.021*** [0.001]	0.023*** [0.002]	0.023*** [0.002]
Some College +			0.013*** [0.001]	0.008*** [0.001]
Married				0.009*** [0.001]
Smoker				-0.010*** [0.001]
Constant	0.504*** [0.001]	0.506*** [0.001]	0.492*** [0.002]	0.490*** [0.002]
Observations	4180901	4180901	2784809	2442889
Year FE		Y	Y	Y



# Birth Quality (Birth Order=2)

Table 17 : Birth Quality by Age and Season

	(1) Birthweight	(2) LBW	(3) VLBW	(4) Gestation	(5) Premature	(6) APGAR
Aged 25-39	55.906*** [1.983]	-0.021*** [0.001]	-0.004*** [0.000]	0.359*** [0.008]	-0.034*** [0.001]	0.042*** [0.003]
Bad Season	-7.646*** [0.646]	0.001*** [0.000]	0.000*** [0.000]	-0.021*** [0.003]	0.003*** [0.000]	-0.003*** [0.001]
Some College +	53.912*** [0.934]	-0.014*** [0.000]	-0.003*** [0.000]	0.078*** [0.004]	-0.016*** [0.001]	0.026*** [0.001]
Married	53.406*** [1.055]	-0.015*** [0.000]	-0.003*** [0.000]	0.073*** [0.004]	-0.022*** [0.001]	0.032*** [0.002]
Smoked in Preg	-224.316*** [1.319]	0.048*** [0.001]	0.003*** [0.000]	-0.182*** [0.006]	0.030*** [0.001]	-0.032*** [0.002]
Constant	3315.338*** [2.658]	0.076*** [0.001]	0.013*** [0.000]	38.238*** [0.010]	0.145*** [0.001]	8.781*** [0.004]
Observations	2436401	2436401	2436401	2441529	2441529	2430349

# Season of Birth, Age and Education (Twins)

Table 18 : Birth Season and Age (Twins Only)

	(1) Good Season	(2) Good Season	(3) Good Season	(4) Good Season
Aged 25-39	0.010** [0.005]	0.010** [0.005]	0.006 [0.006]	0.006 [0.006]
Some College +			-0.005 [0.005]	-0.001 [0.006]
Married				-0.010* [0.006]
Smoked in Preg				0.010 [0.009]
Constant	0.493*** [0.005]	0.494*** [0.006]	0.506*** [0.010]	0.513*** [0.012]
Observations	152415	152415	102544	91158
Year FE		Y	Y	Y

# Birth Quality (Twins)

Table 19 : Birth Quality by Age and Season (Twins Only)

	(1) Birthweight	(2) LBW	(3) VLBW	(4) Gestation	(5) Premature	(6) APGAR
Aged 25-39	-21.836*** [7.606]	0.011* [0.006]	0.010*** [0.004]	-0.294*** [0.044]	0.014** [0.006]	-0.095*** [0.015]
Bad Season	-3.601 [3.983]	0.001 [0.003]	-0.001 [0.002]	0.034 [0.024]	0.001 [0.003]	-0.001 [0.009]
Some College +	64.671*** [7.443]	-0.041*** [0.006]	-0.021*** [0.004]	0.343*** [0.047]	-0.017*** [0.006]	0.132*** [0.018]
Married	6.797 [7.045]	-0.006 [0.006]	-0.008** [0.003]	0.010 [0.043]	0.016*** [0.006]	0.021 [0.016]
Smoked in Preg	-142.752*** [11.671]	0.102*** [0.009]	0.039*** [0.006]	-0.304*** [0.074]	0.040*** [0.009]	-0.107*** [0.029]
Constant	2289.810*** [14.889]	0.607*** [0.012]	0.114*** [0.007]	34.911*** [0.089]	0.625*** [0.012]	8.430*** [0.032]
Observations	89960	89960	89960	91072	91072	90395

# Season of Birth, Age and Education (Fetal Deaths)

Table 20 : Birth Season and Age (Fetal Deaths Only)

	(1) Good Season	(2) Good Season	(3) Good Season	(4) Good Season
Aged 25-39	0.020*** [0.001]	0.020*** [0.001]	0.018*** [0.002]	0.017*** [0.002]
Some College +			0.010*** [0.001]	0.008*** [0.001]
Married				0.007*** [0.001]
Smoked in Preg				-0.008*** [0.001]
Constant	0.497*** [0.001]	0.497*** [0.001]	0.488*** [0.002]	0.487*** [0.002]
Observations	4878223	4878223	3187435	2804307
Year FE		Y	Y	Y

Sample consists of all fetal deaths at birth order 1 of US-born, white, non-hispanic mothers. Fetal deaths are included if occurring between 25 and 44 weeks of gestation. Education is recorded for fetal deaths only prior to 2008.