Marital Fertility and Wealth in Transition Era France – a First Look

Background

The Princeton project on the history of European population concluded that the decline of marital fertility during the late 19th century was unrelated to socioeconomic changes (Coale and Watkins 1986). Recently, there has been a steady flow in the number of revisionist studies which insist that this role has been underplayed by the project. Challenges to the Princeton orthodoxy cite the level of aggregation of the analysis and the lack of relevant socioeconomic variables as reasons for skepticism of the Project's conclusions (for a recent critique see Guinnane and Brown 2007).

As part of my ongoing PhD research, I have linked individual level demographic data to wealth at death data for 4 villages in France covering the tumultuous period of the late 18th and early 19th centuries. This first paper will describe the changing nature of the relationship (and if any ever existed) between wealth and fertility in my sample. Here the data collected will be described, and some preliminary analysis is undertaken, namely negative binomial regressions on family size, and the calculation of Age Specific Marital Fertility rates, along with the Coale-Trussel fertility control parameters.

Previous Work

Also using the Henry demographic data, Weir examined the Income-fertility relationship in Rosny-Sous-Bois, using the tax records for 1747. In a cross-sectional analysis, he found no difference in marital fertility behavior between the income groupings (Weir 1995 p.24). Hadeishi, also using tax records, analyzed the town of Nuits in Burgundy from 1744-1792, and found a positive relationship between marital fertility and income (2003 p.489).

There has been no previous study (to the author's knowledge) which has examined the wealth-fertility relationship during the demographic transition in France.

The Demographic Data[1]

The demographic data to be analyzed is taken from Louis Henry's national random sample of 41 villages, roughly covering a span of over two centuries, from the late 17th to early 19th centuries (Weir 1995 p.2). This data[2] is the result of the application of the techniques of family reconstitution to parish registers. Considered a "truly revolutionary" study, it enabled historians and demographers to work together, with variables much more refined than crude series (Saito 1996

---

[1] I thank George Alter for providing his version of the Henry dataset.

[2] The summary papers for the INED French family reconstitution are:
Houdaille, J. 'Fécondité des mariages dans le quart nord-est de la France de 1670 a 1829' . *Annales de Demographie Historique,* (1976)
Henry, L. Houdaille, J. **'**Fécondité …le quart nord-ouest' *Population (French Edition),*(1973),
Henry, L. 'Fécondité …le quart sud-ouest de la France'. *Annales de Demographie Historique* (1972) and
Henry, L. 'Fecondite …le quart sud-est de la France', Population *(French Edition)*, (1978)**.**

p.537). The result is a goldmine of individual level information on the demographic characteristics of historical France.

Tables des Successions et Absences

The source for wealth data are the *Tables des Successions et Absences*[3] (TSA), which are stored in the various *Archives Departmentales* in France. The TSAs were originally constructed for tax purposes and recorded all deaths in a locality, along with detailed information on date of death, residence, profession, age at death and marital status. Uniquely, the value of an individual's estate at death was noted, with a distinction between cash and property holdings (Bourdieu et al. 2004 p.4). Crucially, the TSAs recorded everybody, including those with zero assets at death (typically coded as "rien"). Almost ¼ of the individuals in the sample I use fall into this category.

Due to the fact that the property valuation recorded in the TSAs only covered property held in the locality, it is possible that the values calculated here are underestimates of the true property wealth of individuals. However, this bias only affects a small minority of the sample. According to Bordieu et al, 85% of individuals in the "TRA" sample (also based on the TSAs) had 1 property record, leaving 15% with 2 or more (2004 p.7).

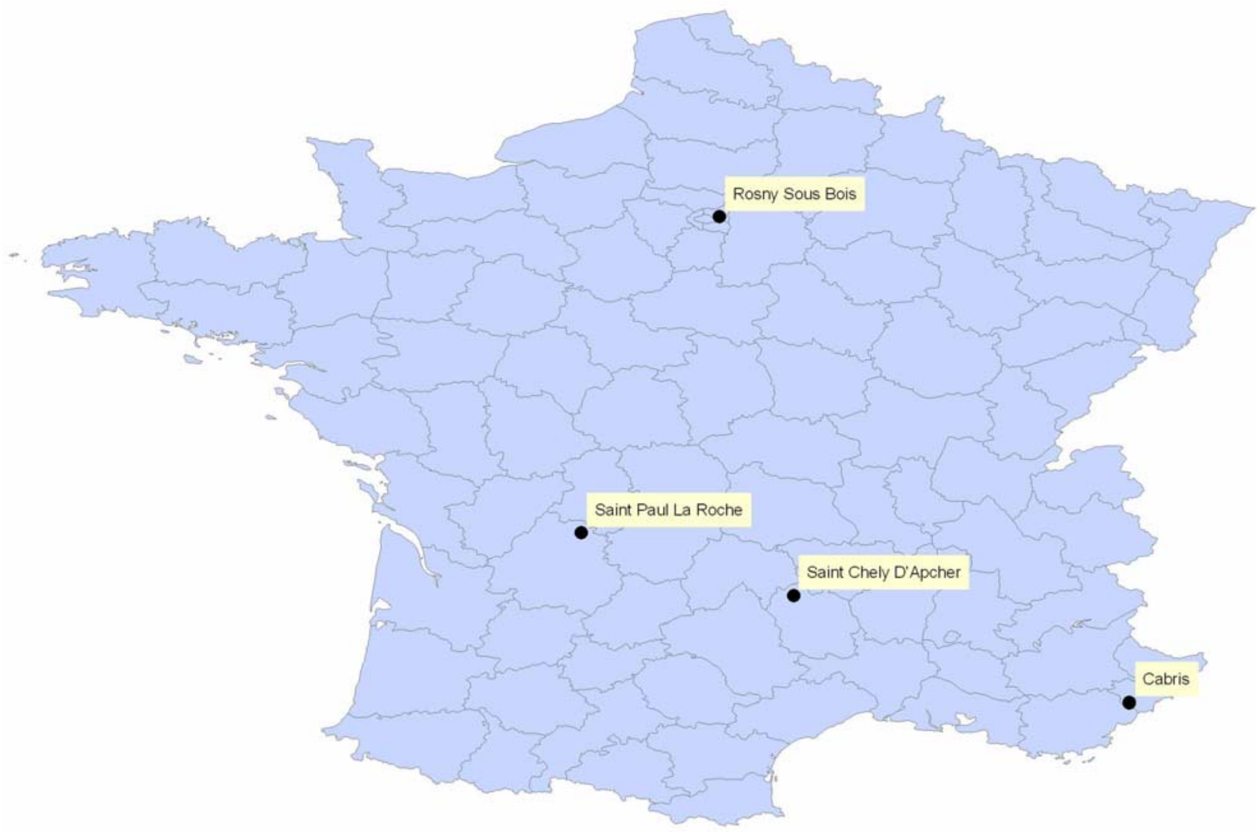
Attempts to assess the accuracy of the wealth information in the TSAs are limited by the fact that "very few alternative sources exist" (Bourdieu et al. 2004 p.6). However, Bourdieu et al. test the validity of the Tables against other published data and find the TSA to yield consistent results (2004 p.7).

Description of data

The Henry demographic data set[4] was linked to records from the "*Tables des Successions et Absences*" (TSA hereafter). The links were based upon name, profession, age at death and date of death. These criteria serve to place close to 100% certainty in the accuracy of the links. Ultimately, 4 villages were selected on the basis that they were the best represented after linking. These villages had the properties of holding a significant number of individuals dying after 1810 (when the TSAs start to record estimates of wealth), and also having the TSAs preserved in the relevant *Archive Departmental*.

Villages in Sample

[3] In English "Tables of Bequests and Absent Persons" (Bourdieu et al. 2004 p.4).
[4] A revised version of which was kindly supplied to me by George Alter.



Village	Department	Region	Pop. 1821[5]	Total Obs.	Male Only Obs.	Female Only Obs.	Both Wealth Obs.[6]
Cabris	Alpes-Maritime	SE	1,737	360	115	147	98
Saint Paul Le Roche	Dordogne	SO	1,692	314	146	126	42
Saint Chely D'Apcher	Lozere	SE	1,764	258	85	94	79
Rosny Sous Bois	Seine - St. Denis	NE	822	168	57	57	54
Total				1,100	403	424	273

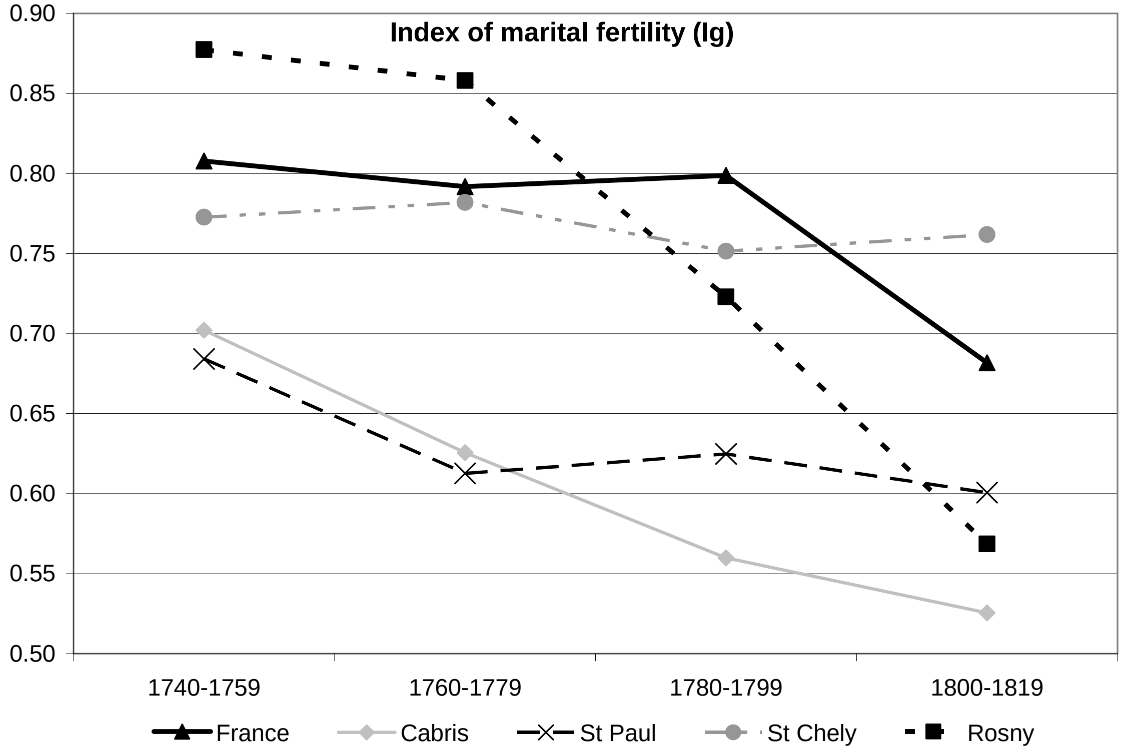
The sample covers individuals who died roughly between 1810 and 1870, and the year of births covered in the sample ranges roughly a century from the 1720s until the 1820s. The fertility experience of these villages, relative to the National trend is plotted in the following graph. For each village, I have calculated a period measure of marital fertility – Coale's index of marital fertility (I_g). I_g represents marital fertility relative to an observed maximum – that of the Hutterites (an

[5] Source: Houdaille 1984 p.88

[6] 'Male only', 'Female only' and 'both' refer to the successful linking of the Henry 'parents' data (where husband and wife are linked) to the TSA where spouses were not linked.

Anabaptist American group, who married early and practiced no control of fertility for religious reasons).

The Trend in Marital fertility
Index of Marital Fertility (I_g) by Sample Village, Contrasted with the National trend



The National trend in I_g (Weir 1994 p.330) shows a sharp decline from high levels in the 1780-99 period. Interestingly, the sample villages display a high level of heterogeneity with respect to the trend in marital fertility. Rosny has exceptionally high marital fertility which then proceeds to decline dramatically from 1760-79 period to the post 1780s. Both Cabris and St Paul have relatively low levels of marital fertility (to the other villages and the National trend), with a trend towards decline evident in Cabris from the 1740-1759 period. The initial trend towards decline in St Paul stalls after 1760, and along with St Chely, whose fertility remains high throughout, no trend towards sustained decline is evident.

Occupational Structure
The Henry dataset contained 617 unique occupation descriptions. These occupations were sorted into 4 categories Elites, professional and land owner class, middle and low grade occupations and finally laborers and farmhands. The distribution of the whole Henry sample with respect to these divisions is reported in the following table.

<u>Occupational Classifications for Sample as a whole</u>

Code	Definition	Frequency	Percentage
1	Elite	318	3.0%
2	Professional/Owners	998	9.5%
3	Middle/Lower Occupations	3490	33.1%
4	Labourers/"Cultivators'	5723	54.4%

For the sample I have collected, there was no significant change in occupational structure over time (based on year of marriage before and after 1800 –table in appendix). The potential inaccuracies of using occupation as a proxy for socioeconomic status are illustrated by analysing the distribution of real wealth within the occupational classifications. As the following table reports, there is a high degree of variance in real wealth at death within the groups.

Table: Real wealth by Occupational coding

Real Wealth					
Occupational Group	Obs.	Mean	Standard Deviation	Min	Max
1	7	17,045.25	20,474.31	46.8	58,096.93
2	46	4,201.4	6,069.915	0	28,340.14
3	64	1,903.082	4,418.38	0	30,995.29
4	142	1,844.958	5,898.314	0	63,270.06
None listed	417	2,479.32	6,960.701	0	74,463.3

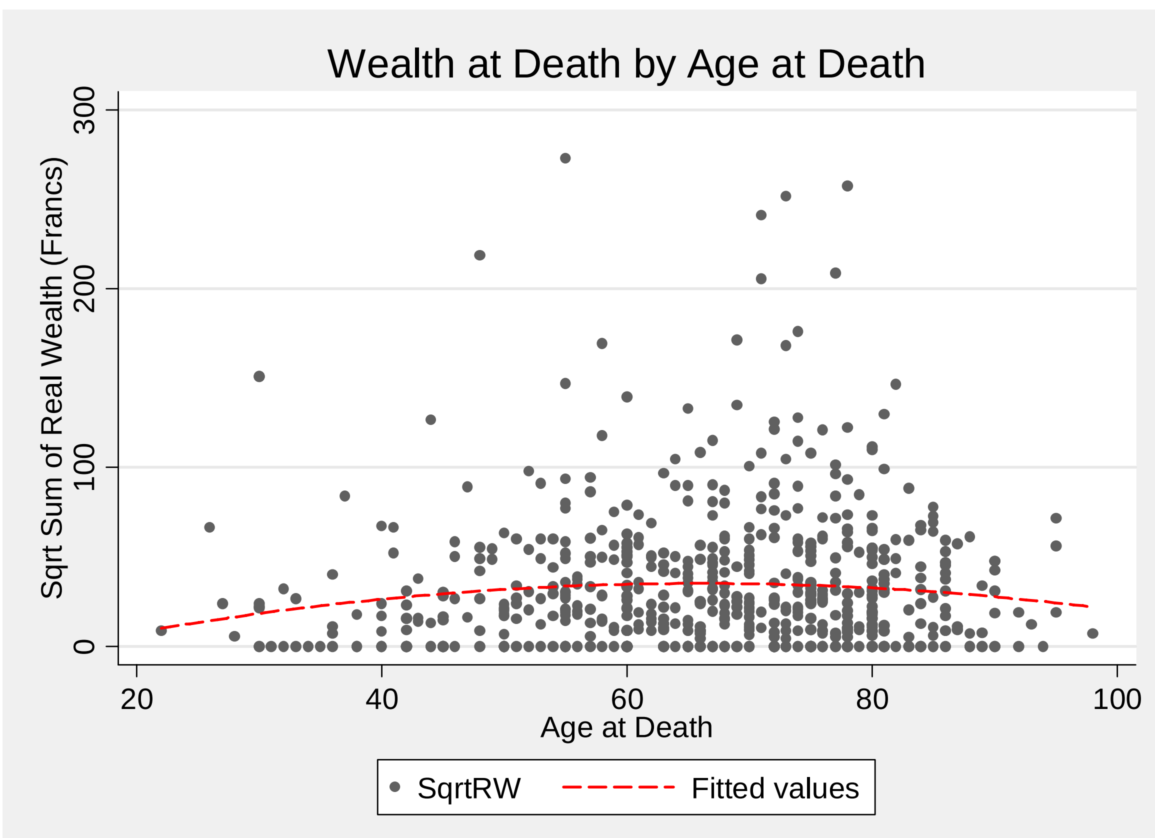
The occupational distributions for the villages used in this study are given below. There are a number of notable deviations from the national pattern. Cabris contains significantly fewer professionals and landowners while St Paul and Rosny have significantly higher labourers and farm workers. Most interestingly however, is the relatively small proportion of the bottom occupational division (labourers and farm workers) in St Chely.

Table: Occupational Structure by Village (blanks are omitted)

Village	Code	Freq.	Percent
Cabris			
	1	3	1.73
	2	43	24.86
	3	20	11.56
	4	107	61.85
	Total	173	100
St Paul			
	2	2	3.92
	3	9	17.65
	4	40	78.43
	Total	51	100

St Chely			
	1	5	4.76
	2	18	17.14
	3	63	60
	4	19	18.1
	Total	105	100
Rosny			
	1	1	1.45
	2	4	5.8
	3	10	14.49
	4	54	78.26
	Total	69	100

Life Course Effects
In aggregate, people tend to accumulate wealth over the life cycle, before dissaving and intervivos bequests to offspring act to reduce the wealth held. This will have the effect of biasing the estimates from the TSA downward, with respect to true wealth, for those who died after this point. The data I use supports this notion, as the following graph illustrates (672 male observations).



An OLS regression was run with the Square root of real wealth as the dependent variable, with age and age squared as the independent variables.

OLS regressions on the Square root of Real Wealth

Variable	Coefficent	Standard Error	*P*
Age at Death	1.71	0.76	0.02
Age at Death Squared	-0.013	0.006	0.03
Constant	-21.4	23.2	.36
Adjusted R-Squared		0.005	
Observations		672	

The reported coefficients on age at death, which are both significant at the 5% level, indicate a turning point age of 66.04[7], beyond which the relationship between wealth and age at death turns negative.

Implications of the Life Course for the Study

There is a possibility that the life course pattern of wealth accumulation and subsequent decline may blur the true level of wealth of an individual in the sample. However, I consider this probability quite small as the slope of the line is so flat. There are no significant negative associations revealed by the analysis of the aggregate data between the level of real wealth and age at death.

In total nearly 60% of the sample died above 66, and are taking their value of wealth at death carries a risk of undervaluation due to the life course effects. The OLS regression on the square root of real wealth allows us to calculate an average bias (assuming the true level of wealth is reached at age 66) based on the average life course relationship between wealth and age.

Estimated Possible Downward Bias	Affected Age Groups	Obs.	% of Sample affected
5%+	66-98	394	58.61%
10%+	86-98	42	4.32%
20%+	95-98	4	0.15%

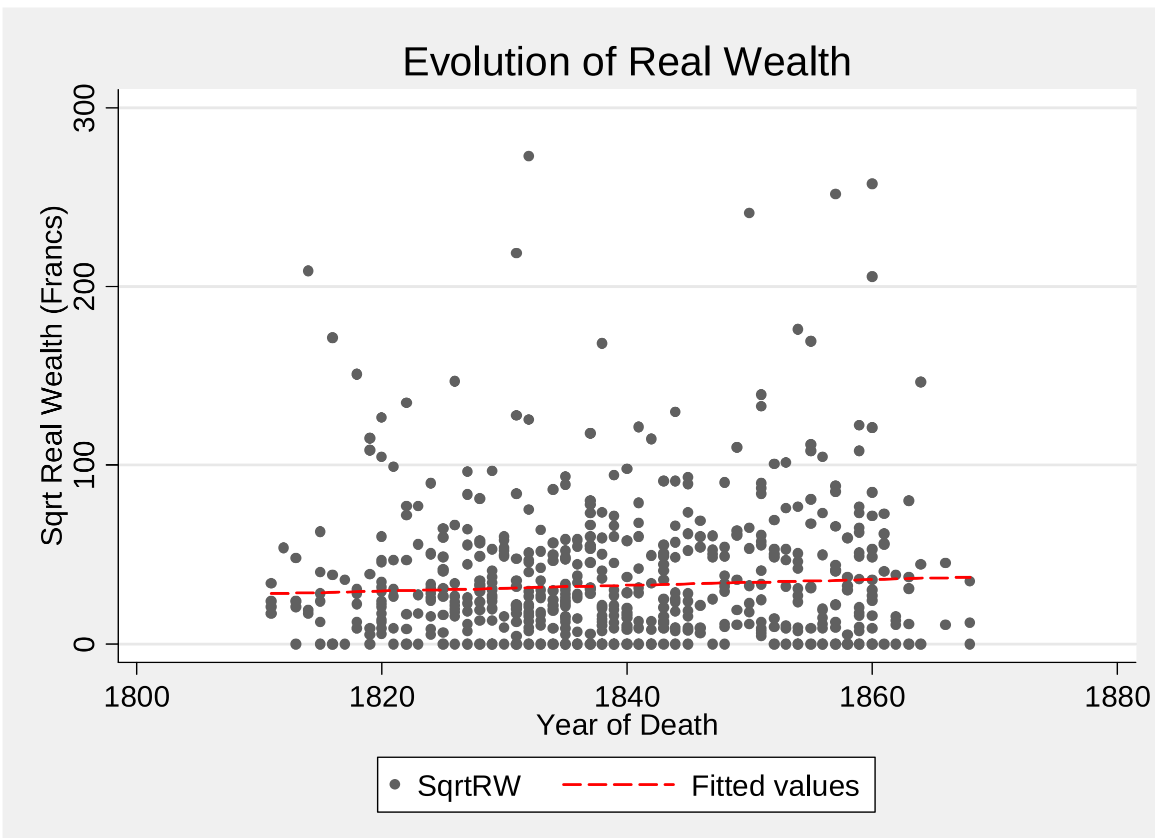
While the majority of the sample is at risk from underestimation of true wealth due to life course effects, any serious bias (>10%) is likely to only affect less than 5% of the sample.

[7] Equivalent to the point on the quadratic fit of the wealth and age observations where the slope is equal to zero. Calculated via differentiating the regression equation of the quadratic fit, setting equal to zero, and solving for age at death.

Ultimately the analysis presented here will split the wealth distribution in 3. The possibility of bias from underestimation must be considered minimal as a result of such a wide division of the sample.

Time and Wealth

There is a statistically insignificant effect of year of death on Real Wealth. For analysis, the sample will be split into 3 Wealth groups. As there was no time trend in the evolution of real wealth during this period, the division of wealth is calculated over the entire sample, disregarding sub-period. The choice of 3 wealth cuts follows Weir (1995) and Gutmann and Watkins (1990), and makes sense when we consider that these villages were primarily agricultural and the socio-economic stratification, as perceived by the population themselves, was probably relatively simple (However, Rosny sous Bois, close to Paris, could perhaps not be considered as such).



The method for the wealth division is to simply split the distribution of wealth of the whole sample into 3. The division and subsequent analysis is based upon male wealth at death only.

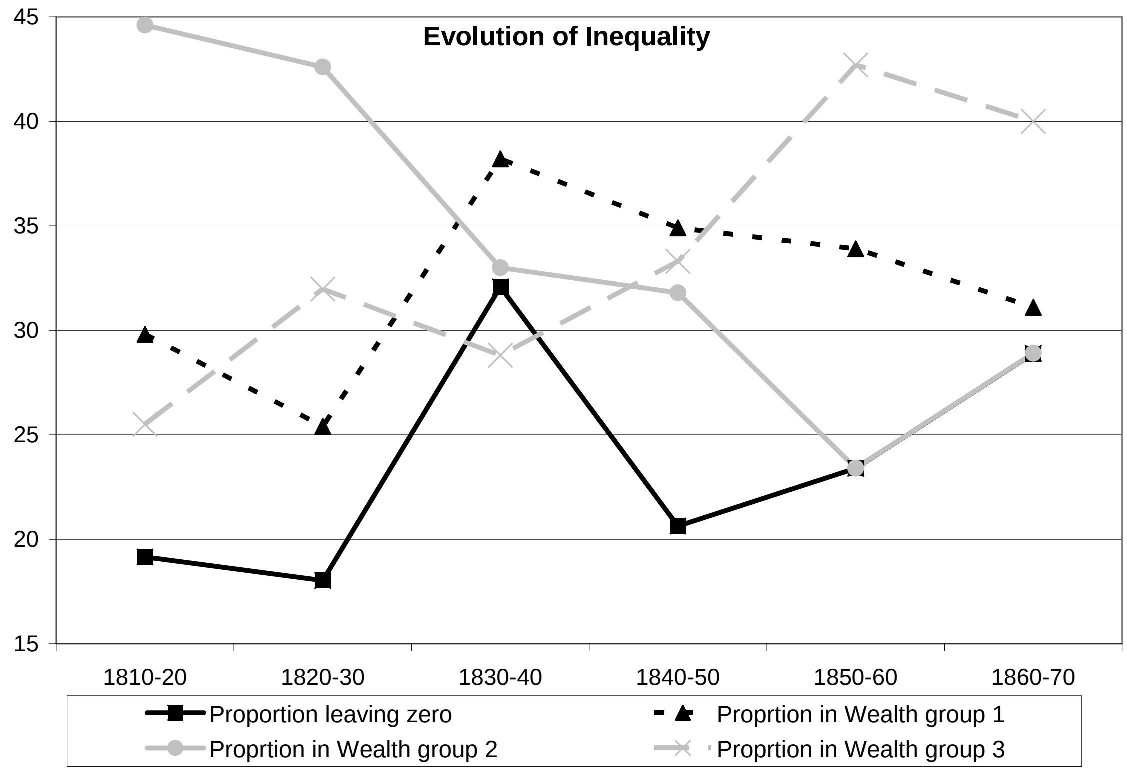
Division	Min.	Max.	Mean
1	0	79.6	15.6
2	81.3	1,299.96	550.5

3	1,330.5	10,580.3	7,123.8

Observations (number of families) by Division and Village

Village	Division		
	1	2	3
Cabris	49 (7.25%)	77 (11.39%)	87 (12.87%)
St Paul	100 (14.79%)	49 (7.25%)	39 (5.77%)
St Chely	47 (6.95%)	68 (10.06%)	49 (7.25%)
Rosny	30 (4.44%)	31 (4.59%)	50 (7.40%)

The figure in parenthesis indicates the percentage of the sample represented by this village and wealth group combination.



Summary Statistics, by year of Marriage

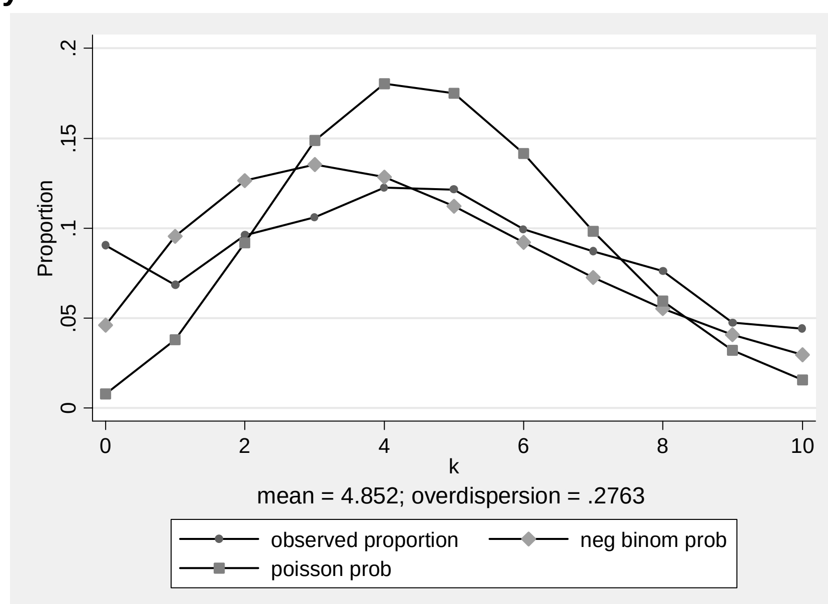
				Year of Marriage 1748-1800			
Village	**Male "Real" Wealth**	**Female "Nominal" Wealth**	**Male Age at Death**	**Female Age at Death**	**Male Age at Marriage**	**Female Age at Marriage**	**Children ever born**

Cabris	2138.3	630.5	70.0	69.9	26.1	22.1	5.2
Saint Paul Le Roche	1532.9	169.7	67.7	59.4	22.4[8]	20.1	5.8
Saint Chely D'Apcher	2783.8	143.6	68.3	69.7	27.8	24.5	5.6
Rosny Sous Bois	1409.9	713.3	66.5	69.6	24.9	23.7	5.9
				Year of Marriage 1801-1819			
Cabris	2840.1	744.6	68.5	63.2	29.4	25.2	3.5
Saint Paul Le Roche	1679.6	134.5	59	55.2	28.0	22.5	4.3
Saint Chely D'Apcher	3326.9	737.5	59.5	58.3	30.1	24.8	5.3
Rosny Sous Bois	5538.4	470.5	59.5	61.6	25.2	23.7	3.1

Negative Binomial Regressions on Gross and Net fertility by Wealth Divisions

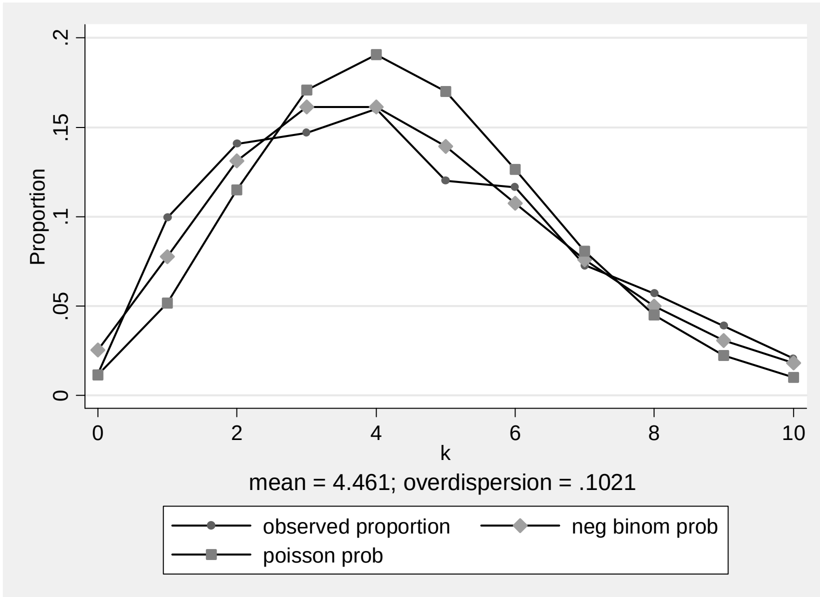
As the dependant variable is a count variable (either gross or net fertility), and because the data is ‘overdispersed’ relative to the Poisson distribution, the appropriate method is to use negative binomial regression. The following graphs illustrate how gross fertility and net fertility fits both the Poisson and negative binomial distributions: The graphs plot the variable against a Poisson distribution with the same mean, and a negative binomial distribution with the same mean and variance (Stata Library 2008).

Gross fertility



[8] This unusually low figure is based on 23 observations from St Paul which contain the male age at marriage for this period, and the values range from 15-36.

Net Fertility



In total, 3 models (all with village level fixed effects, 2 with varying interactions) are applied to the linked Henry-TSA dataset. As well as including the usual demographic variables (woman's age at marriage etc.), a time trend is accounted for by the inclusion of year of marriage. Further, dummies are constructed for the French Revolution (year of marriage greater than 1789) and also the Napoleonic wars (year of marriage lies between 1802-1814). In order to account for expected non-linearities in the wealth fertility relationship, wealth is included in the models as a categorical variable, with dummy variables representing each wealth division. The table below lists the models and their wealth distinctions.

Model	**Wealth Distinctions**
Model 1	Pooled Wealth Effects
Model 2	Periodised Wealth Effects
Model 3	Periodised and Localised Wealth Effects
Model 4-6	Same as 1-3 but with Net fertility as the dependant Variable

The omitted categories are St Chely (Village) and Wealth group 1. The rationale for this is simple: St Paul is the closest village in the sample to a community practicing "natural fertility" (total marital fertility is highest here, and the calculated Coale-Trussell measures reveal small insignificant and deviations from both level and pattern of fertility (see Summary table of Demographic Analysis).
The dependant variable is either gross fertility (children ever born) or net fertility (children ever born minus children died before 10). The 3 models are applied to each. Village level fixed effects are also included, but not reported.

The preliminary results of the regressions are listed in the following table.

Negative Binomial Regressions: Fixed Effects and Interaction Models

	Gross Fert. 1	Gross Fert. 2	Gross Fert. 3	Net Fert. 4	Net Fert. 5	Net Fert. 6
Year of Marriage	-0.011**	-0.011	-0.009*	-0.011**	-0.012***	-0.004*
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)
Age at Marriage, Female	-0.065***	-0.064***	-0.061***	-0.043***	-0.042***	-0.039***
	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)
Age at Death, Female	0.010***	0.010***	0.010***	0.011***	0.011***	0.011***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)
Age at Death, Male	0.002	0.001***	0.002	0.004	0.003	0.004*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Revolution	0.114	0.125	0.102	0.154	0.170	0.156
	(0.091)	(0.090)	(0.087)	(0.088)	(0.089)	(0.089)
Napoleonic Wars	0.103	0.106	0.150*	0.028	0.037	0.100
	(0.07)	(0.069)	(0.076)	(0.071)	(0.071)	(0.082)
Wealth Group2	-0.012	0.099		0.010	0.114	
	(0.062)	(0.103)		(0.062)	(0.112)	
Wealth Group3	-0.154*	0.026		-0.045	0.201	
	(0.062)	(0.110)		(0.062)	(0.118)	
Wealth Group2, P1			0.022			0.127
			(0.144)			(0.166)
Wealth Group3, P1			0.195			0.480
			(0.148)			(0.163)
Wealth Group1, P2			0.210			0.349
			(0.192)			(0.213)
Wealth Group2, P2			0.32			0.363
			(0.176)			(0.194)
Wealth Group3, P 2			0.069			0.224
			(0.189)			(0.210)
Cabris, WG2		-0.19			-0.212	
		(0.149)			(0.154)	
Cabris, WG3		-0.226			-0.361*	
		(.153)			(0.157)	
St Paul, WG2		0.142			0.074	
		(0.187)			(0.192)	
St Paul, WG3		-0.031			-0.076	
		(0.199)			(0.203)	
Rosny WG2		-0.35*			-0.203	
		(0.173)			(0.176)	
Rosny, WG3		-0.532**			-.522**	
		(0.177)			(0.179)	
Wealth, Village, Time Period Interactions	No	No	Yes (See Next Page)	No	No	Yes (See Next Page)
Constant	2.364***	2.307***	2.025***	1.559***	1.510***	1.130***
	(0.211)	(.211)	(0.233)	(0.215)	(0.219)	(0.255)
N	447	447	447	411	411	411
Psuedo R2	0.091	0.097	0.109	0.068	0.075	0.0928

*** Significant at .001% level
** Significant at .01% level
*Significant at.05% level

Cabris, WG2, P1	-0.216	-0.300
	(0.196)	(0.214)
Cabris, WG3, P1	-0.465*	-0.673***
	(0.196)	(0.208)
Cabris, WG1, P2	-0.541*	-0.602*
	(0.226)	(0.243)
Cabris, WG2, P2	-0.632**	-0.579**
	(0.203)	(0.217)
Cabris, WG3, P2	-0.570**	-0.635*
	(0.217)	(0.235)
St Paul, WG2, P1	0.051	-0.263
	(0.274)	(0.290)
St Paul, WG3, P1	-0.394	-0.443
	(0.286)	(0.288)
St Paul, WG1, P2	-0.464	-0.698*
	(0.275)	(0.291)
St Paul, WG2, P2	-0.219	-0.246
	(0.272)	(0.281)
St Paul, WG3, P2	-0.214	-0.475
	(0.290)	(0.310)
Rosny, WG2, P1	-0.308	-0.259
	(0.208)	(0.225)
Rosny, WG3, P1	-0.504*	-0.569*
	(0.218)	(0.225)
Rosny, WG1, P2	-0.609*	-0.722*
	(0.279)	(0.297)
Rosny, WG2, P2	-0.763**	-0.596*
	(0.267)	(0.280)
Rosny, WG3, P2	-1.016***	-1.125***
	(0.247)	(0.276)

*** Significant at .001% level
** Significant at .01% level
*Significant at.05% level

For both gross and net fertility, both female age at marriage and at death are highly significant and the coefficients highly consistent across all variations of the model. The effects of these variables act in the expected directions. - Women who marry later in life should have lower fertility for biological reasons, and those women who die before 50 should contribute significantly to the positive fertility-female age at death relationship. The time trend (as measured by year of marriage) is generally significant.

Pooled Wealth Effects

Model 1 constructs gross fertility as a function of the relevant demographic variables, village level fixed effects, event dummies (the Revolution and the Napoleonic Wars) and categories for wealth (3 as discussed previously). Relative to the omitted category (the bottom wealth group), the reported coefficients for Wealth groups 2 and 3 are negative and increase in scale relative to the wealth group – suggesting a negative wealth-fertility relationship. However, the coefficient on wealth group 2 fails to be significant at the 5% level. On the other hand, we see a large and statistically significant effect of wealth group 3 on gross fertility. When this model is run with net fertility as the dependant variable (model 4), the wealth effects disappear.

Village level specific Wealth fertility relationships? Models 2 and 5
To account for varying directions in the relationship between wealth and fertility in relation to locality, interactions are included in models 2 and 5 to represent village-wealth group combinations. The models here also include all of model 1 and 4's variables. In relation to gross fertility, wealth groups 2 and 3 in Rosny have significantly lower fertility, with the coefficient on the latter being especially large. In relation to net fertility, again wealth group 3 in Rosny is significant, large and negative. However, wealth group 2 in Rosny does not register a significant coefficient, but wealth group 3 in Cabris is negative, significant and large.

Period-Local-Wealth Relationship

However, there is a considerable likelihood that this model misrepresents the true wealth-fertility relationship. As the period as a whole is one of transition and declining fertility, surely there is a need to account for time in this analysis. The included time trend, based on year of marriage does not allow for the possibility that the Wealth fertility relationship is changing over time. Models 3 and 6 account for period changes in the wealth-fertility relationship via interaction terms between wealth group, locality and period. Period is categorised by splitting the sample in 2 based on year of marriage (1801).

In relation to these models, the significant coefficients to note are:

Village	Period	Wealth Group	Gross Fertility	Net Fertility
Cabris				
	1	3	-.465***	-.673***
	2	1	-.541*	-.602*
	2	2	-.632**	-.579**
	2	3	-.570**	-.635*
Rosny				
	1	3	-.504*	-.569*
	2	1	-.609*	-.722*
	2	2	-.763***	-.596*
	2	3	-1.02***	-1.125***

For these village-period-Wealth group combinations, the negative binomial models fit significantly lower numbers of children (both gross and net). For period 1, only those in the top wealth division in Cabris and Rosny register a significantly lower family size than the reference group. Moving to period 2, the variables for which all coefficients (both gross and net) are significant are *all* the wealth groups in Cabris and Rosny. The direction of the wealth fertility relationship is negative (at least between the bottom and top wealth groups in Cabris). This result is interesting because it suggests that fertility reduction by the top wealth division predicts fertility reduction by the rest of the population, in aggregate. This observation also constitutes what Gutmann and Watkins term "an early warning system" for aggregate fertility decline – the warning being the lower cross sectional fertility by certain groups, in this case the top third of the wealth distribution (1990 Title).

Demographic Analysis – Age Specific Marital Fertility Rates(ASFMRS) by Wealth Class

Following the regressions on gross and net family size, this section decomposes the fertility trends by age group. Measures of fertility control are calculated and discussed. The periodisation employed in this section is based upon year of birth of child, with a cut point at 1800. This differs from the periodisation used for the negative binomial regressions on family size which were based on year of marriage. This means that the results here are not strictly comparable with those of the previous section, but have the advantage of being true period measures[9].

The ASFMRs are detailed in the appendix.

Coale-Trussell Fertility Model

In the Coale-Trussell fertility model, the shape of the age specific marital fertility schedule in relation to that of a population practising natural fertility (*m)* is interpreted as a measure of fertility control. It takes the following form:

$$R_{ia} = n_a . M_i \bullet \exp(m_i \bullet v_a)$$

Where

R_{ia} is the expected marital fertility rate for the *a*th age group of the *ith population*

n_a is the standard age pattern of natural fertility

v_a is the typical age specific deviation of controlled fertility from natural fertility

With these definitions it follows that M_i represents the *i*th populations fertility level and m_i measures fertility control.

(Xie and Pimentel 1992 p.977).

Where M_i is close to 1, the population in question has the same age pattern of fertility as a population practising natural fertility. Where m_i is close to 1, the population is a standard controlling population. Where m_i is close to zero, the population is practising natural fertility. A “justifiable rule of thumb” is to take positive values of m_i >.2 as evidence for fertility control, with values below .2 as

[9] As the negative binomial regressions were on family size, it was not possible to periodise them according to year of birth of child.

inconclusive (Okun 1994 p.200). Xie and Pimentel (1992 p.977) discuss the development of this model into a statistical model via the identity:

$R_{ia} = T_{ia} \bullet B_{ia}$

Where

T_{ia} is the total exposure time in woman years

B_{ia} is the total births for the age group

In combination, and taking the natural log of both sides we arrive at the following:

$$\log(B_{ia}) = \log(T_{ia} \bullet n_a) + \log(M_i) + m_i \bullet v_a$$

As Xie and Pimemtel discuss (1992 p.977): Where n_a and v_a are known, M_i and m_i can be calculated as the constant and the slope coefficent in a log-linear regression of births in age group *a,* population *I* on v_a. The $\log(T_{ia} \bullet n_a)$ term is included in the regression with its coefficient restricted to 1. It is assumed that births follow an independent Poisson distribution in each age interval[10].

For each village, wealth group and period[11] combination, I have calculated Age specific Marital Fertility Rates (ASMFRs). Following this I have measured the level and scale of fertility control via the Coale-Trussell index of fertility limitation[12].

I use Coale and Trussell's estimated values for n_a and v_a (listed in Xie and Pimentel 1992 p.979). :

[10] The distribution here will differ from family size over all women in the sample, but the legitimacy of assuming a Poisson distribution for each sub-sample of ASFRs is untested at this stage.

[11] The periodisation for the demographic analysis is based upon year of birth of child, with the dividing year being 1800.

[12] The Stata code for the Poisson regression used was deduced from the SAS and S-Plus code discussed in Schmertmann 1999 http://www.demographic-research.org/Volumes/Vol1/5/html/3.htm .

Summary table of demographic analysis by village and wealth class

Village	Wealth Group		
Cabris	1	2	3
Period 1			
TFR	6.55	6.2	7.55
M	0.900	0.671	0.779
S.E.	0.150	(0.120)	(0.118)
‘m’	0.417	-0.050	-0.130
S.E.	(0.301)	(0.187)	(0.171)
Period 2			
TFR	6.04	6.04	5.48
M	0.808	0.758	0.784
S.E.	(0.149)	(0.175)	(0.142)
‘m’	0.353	0.240	**0.467**
S.E.	(0.184)	(0.197)	(0.181)
St Paul			
Period 2			
TFR	5.72	7.31	8.01
M	0.638	0.769	1.116
S.E.	(0.170)	(0.180)	(0.223)
‘m’	-0.017	-0.110	0.416
S.E.	(0.220)	(0.227)	(0.109)
St Chely			
Period 1			
TFR	7.74	8.41	9.03
M	0.838	0.975	1.064
S.E.	(0.165)	(0.161)	(0.153)
‘m’	-0.018	0.071	0.118
S.E.	(0.211)	(0.219)	(0.227)
Period 2			
TFR	7.9	8.48	10.09
M	0.864	0.945	1.407
S.E.	(0.150)	(0.128)	(0.139)
‘m’	-0.033	0.004	0.401
S.E.	(0.180)	(0.156)	(0.182
Rosny			
Period 1			
TFR	9.98		7.28
M	0.778		0.782
S.E.	(0.206)		(0.282)
‘m’	-0.548		-0.071
S.E.	(0.291)		(0.472)
Period 2			
TFR	7.59	5.43	4.99
M	1.036	0.589	0.800
S.E.	(0.241)	(0.327)	(0.211)
‘m’	0.327	-0.030	**0.757**
S.E.	(0.270)	(0.355)	(0.300)

Interpretation of Results

Of the 17 different period-wealth group-village combinations for which it was possible to construct ASMFRs and the Coale-Trussell measures of fertility, only 2 register statistically significant values for ‘m’ above the unambiguous fertility control threshold of .2. The top third of the wealth distribution in Cabris and Rosny show clear evidence of fertility control in the 1800-1840 period.

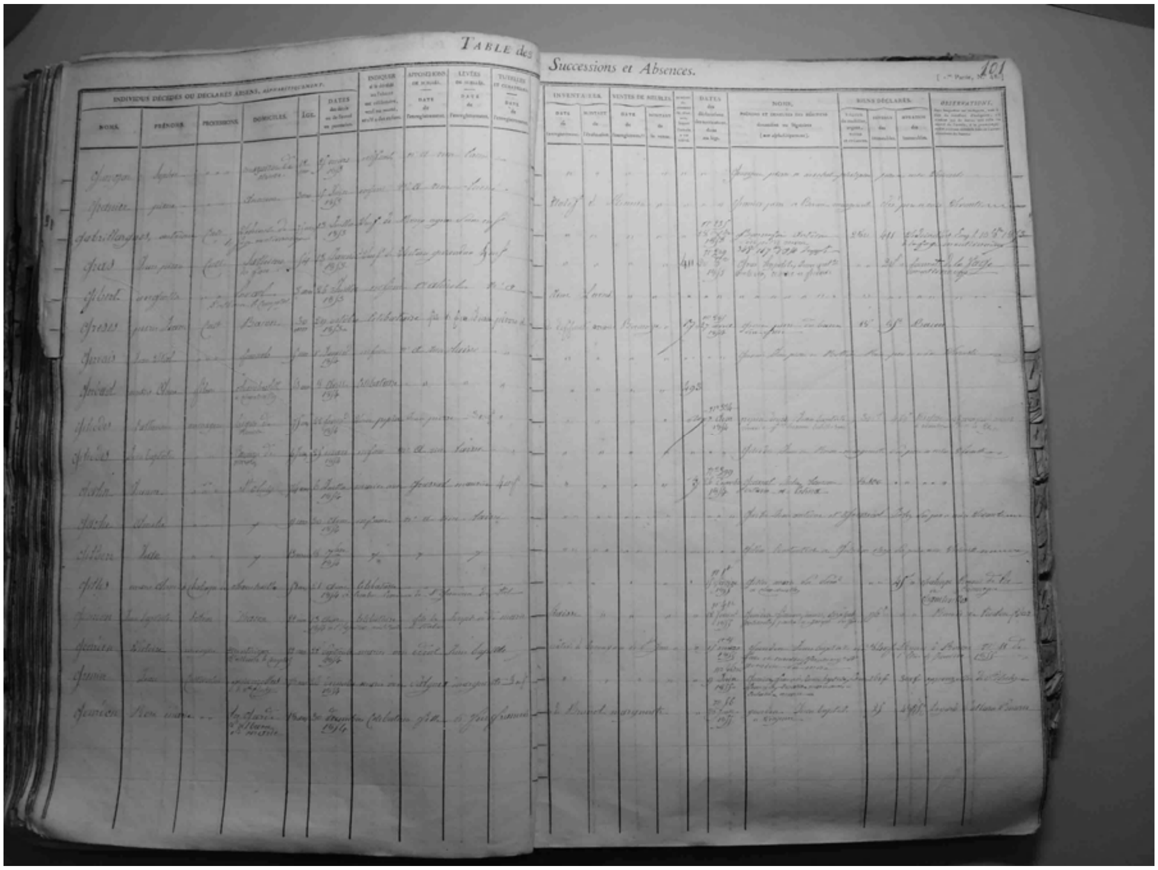
Preliminary Conclusion and Future Work

This paper has discussed and outlined my current project on the decline of French fertility. I have demonstrated that differential fertility existed between different segments of the wealth distribution. Namely, the top 1/3 of the income distribution in Cabris and Rosny Sous Bois reduced their fertility before the rest of the Village, and this decline was followed by aggregate fertility decline in the next period. In terms of parity dependant fertility control, the Coale and Trussel measure *m* indicated that this was only present for the top 1/3 of the wealth distribution in Cabris and Rosny after 1800. This is not a hugely surprising result, and is in line with current revisionist studies (e.g Guinnane 2007). However, the (preliminary) result is important as it is the first documentation of the wealth fertility relationship in Transitional era France.

Future work will include the application of a Cox hazard model, and the integration of theory and further discussion. These results will also be contrasted with the results from a similar wealth-fertility project for England, the data for which is currently being collected.

Appendix

The Source Material



ASFR and Wealth data, by Village

Fertility Differentials by Wealth

Cabris

	Wealth Group 1 Exp.	Wealth Group 1 Births	Wealth Group 2 Exp.	Wealth Group 2 Births	Wealth Group 3 Exp.	Wealth Group 3 Births
1760-1800						
Exposure and Births						
20-24	73	30	131	38	111	39
25-29	82	29	164	52	142	52
30-34	60	14	133	38	143	46
35-39	33	9	99	17	97	27
40-44	25	1	72	11	81	14
45-49	10	0	46	1	51	1
Age Specific Marital Fertility Rates						
20-24	0.411		0.290		0.351	
25-29	0.354		0.317		0.366	
30-34	0.233		0.286		0.322	
35-39	0.273		0.172		0.278	
40-44	0.040		0.153		0.173	
45-49	0.000		0.022		0.020	
Total Marital Fertility	6.55		6.20		7.55	
Ig	0.65		0.58		0.70	
Coale-Trussell Measures						
M	0.900		0.671		0.779	
S.E.	0.150		0.120		0.118	
"m"	0.417		-0.050		-0.130	
S.E.	0.301		0.187		0.171	
1800-1840						
Exposure and Births						
20-24	49	18	35	12	63	20
25-29	116	36	80	27	125	40
30-34	158	42	135	32	169	40
35-39	190	33	179	32	207	30
40-44	196	15	203	20	219	15
45-49	200	3	216	3	236	2
Age Specific Marital Fertility Rates						
20-24	0.367		0.343		0.317	
25-29	0.310		0.338		0.320	
30-34	0.266		0.237		0.237	
35-39	0.174		0.179		0.145	
40-44	0.077		0.099		0.068	
45-49	0.015		0.014		0.008	
Total Marital Fertility	6.04		6.04		5.48	
Ig	0.51		0.50		0.46	

Coale-Trussell Measures			
M	0.638	0.769	1.116
S.E.	0.170	0.180	0.223
"m"	-0.017	-0.110	0.416
S.E.	0.220	0.227	0.109

Fertility Differentials by Wealth
St Paul

	Wealth Group 1		Wealth Group 2		Wealth Group 3	
	Exp.	Births	Exp.	Births	Exp.	Births
1760-1800						
Exposure and Births						
20-24	28	7	20	4	26	8
25-29	18	6	25	7	23	8
30-34	10	1	17	4	12	4
35-39	10	1	15	5	0	2
40-44	3	2	8	1	0	0
45-49	0	0	0	0	0	0
Age Specific Marital Fertility Rates						
20-24	0.25		0.2		0.307	
25-29	0.333		0.28		0.347	
30-34	0.1		0.235		0.333	
35-39	0.1		0.333		#DIV/0!	
40-44	0.667		0.125		#DIV/0!	
45-49	#DIV/0!		#DIV/0!		#DIV/0!	
Total Marital Fertility	#DIV/0!		#DIV/0!		#DIV/0!	
Ig	0.51		0.54		0.70	
Coale-Trussell Measures						
M						
S.E.						
"m"						
S.E.						
1800-1840						
Exposure and Births						
20-24	58	15	48	13	21	9
25-29	88	27	54	22	32	16
30-34	102	23	63	25	39	13
35-39	99	26	61	15	46	10
40-44	89	7	64	4	41	5
45-49	79	1	64	5	44	0
Age Specific Marital Fertility Rates						
20-24	0.258		0.270		0.428	
25-29	0.306		0.407		0.5	
30-34	0.225		0.396		0.333	

35-39	0.262	0.245	0.217
40-44	0.0786	0.062	0.121
45-49	0.012	0.078	0
Total Marital Fertility	5.72	7.31	8.01
Ig	0.53	0.67	0.70
Coale-Trussell Measures			
M	0.638	0.769	1.116
S.E.	0.170	0.180	0.223
"m"	-0.017	-0.110	0.416
S.E.	0.220	0.227	0.109

Fertility Differentials by Wealth
St Chely

	Wealth Group 1		Wealth Group 2		Wealth Group 3	
	Exp.	Births	Exp.	Births	Exp.	Births
1760-1800						
Exposure and Births						
20-24	41	17	48	23	44	23
25-29	80	30	61	25	76	32
30-34	92	29	63	20	70	26
35-39	84	20	63	19	51	17
40-44	84	14	63	11	51	8
45-49	53	2	27	0	24	0
Age Specific Marital Fertility Rates						
20-24	0.414		0.479		0.522	
25-29	0.375		0.409		0.421	
30-34	0.315		0.317		0.371	
35-39	0.238		0.301		0.333	
40-44	0.166		0.174		0.156	
45-49	0.037		0		0	
Total Marital Fertility	7.74		8.41		9.03	
Ig	0.70		0.78		0.83	
Coale-Trussell Measures						
M	0.838		0.975		1.064	
S.E.	0.165		0.161		0.153	
"m"	-0.018		0.071		0.118	
S.E.	0.211		0.219		0.227	
1800-1840						
Exposure and Births						
20-24	47	19	60	26	40	21
25-29	88	30	115	46	69	42

30-34	112	42	133	48	77	35
35-39	121	37	133	45	100	29
40-44	125	17	152	23	100	13
45-49	110	2	153	2	112	1
Age Specific Marital Fertility Rates						
20-24	0.404		0.433		0.525	
25-29	0.340		0.4		0.608	
30-34	0.375		0.360		0.454	
35-39	0.305		0.338		0.29	
40-44	0.136		0.151		0.13	
45-49	0.018		0.013		0.008	
Total Marital Fertility	7.90		8.48		10.09	
Ig	0.72		0.77		0.88	
Coale-Trussell Measures						
M	0.864		0.945		1.407	
S.E.	0.150		0.128		0.139	
"m"	-0.033		0.004		0.401	
S.E.	0.180		0.156		0.182	

Fertility Differentials by Wealth
Rosny

	Wealth Group 1		Wealth Group 2		Wealth Group 3	
	Exp.	Births	Exp.	Births	Exp.	Births
1760-1800						
Exposure and Births						
20-24	28	11	18	8	21	7
25-29	55	22	25	7	26	10
30-34	57	23	19	3	21	7
35-39	33	14	10	0	13	2
40-44	16	6	0	0	8	2
45-49	**0**	0	0	0	1	0
Age Specific Marital Fertility Rates						
20-24	0.392		0.444		0.333	
25-29	0.4		0.28		0.384	
30-34	0.403		0.157		0.333	
35-39	0.424		0		0.153	
40-44	0.375		#DIV/0!		0.25	
45-49	0		#DIV/0!		0	
Total Marital Fertility	9.98		#DIV/0!		7.28	
Ig	0.89				0.68	
Coale-Trussell Measures						
M	0.778				0.782	
S.E.	0.206				0.282	

"m"	-0.548				-0.071	
S.E.	0.291				0.472	
1800-1840						
Exposure and Births						
20-24	15	5	7	2	31	11
25-29	30	15	34	8	61	18
30-34	44	15	53	15	74	13
35-39	72	16	65	9	84	10
40-44	89	9	70	10	93	5
45-49	100	2	63	0	92	0
Age Specific Marital Fertility Rates						
20-24	0.333		0.285		0.354	
25-29	0.5		0.235		0.295	
30-34	0.340		0.283		0.175	
35-39	0.222		0.138		0.119	
40-44	0.101		0.142		0.053	
45-49	0.02		0		0	
Total Marital Fertility	7.59		5.43		4.99	
Ig	0.63		0.49		0.40	
Coale-Trussell Measures						
M	1.036		0.589		0.800	
S.E.	0.241		0.327		0.211	
"m"	0.327		-0.030		**0.757**	
S.E.	0.270		0.355		0.300	

Table: Occupational Structure of Sample by Year of Marriage

code	Freq.	Percent
Year of Marriage<1801		
1	6	2.63
2	40	17.54
3	54	23.68
4	128	56.14
Total	228	100
Year of Marriage>1801		
1	3	1.76
2	27	15.88
3	48	28.24
4	92	54.12
Total	170	100

References

Archives Départementales de la Alpes-Maritime, serie Q3, *Tables Des Successions et Absences*.

Archives Départementales de la Dordogne, serie Q3, *Tables Des Successions et Absences*.

Archives Départementales de la Lozere, serie Q3, *Tables Des Successions et Absences*.

Archives Départementales de la Seine - St. Denis, serie Q3, *Tables Des Successions et Absences*.

Bourdieu, J., Postel-Vinay,G. and Suwa-Eisenmann, A. "Défense et illustration de l'enquête des 3 000 Familles. L'exemple de son volet patrimonial" *Annales de Demographie Historique* (2004)

Castro, N. and Cummins, N.J. "The Relationship between Socioeconomic Status and Marital Fertility in 18th Century France**"** *Unpublished ICPSR Project* (2006)

Coale, A.J. and Watkins, S.C. *The Decline of Fertility in Europe: The revised proceedings of a conference on the Princeton European Population Project* (1986)

Clark, G. and Hamilton, G. "Survival of the Richest: The Malthusian Mechanism in Pre-Industrial England." *Journal of Economic History* (2006)

Guinnane, T.W. and Brown, J.C. "Regions and Time in the European Fertility Transition: Problems in the Princeton Project's Statistical Methodology." *Economic History Review,* (2007)

Gutmann, M.P. and Watkins, S.C. Socio-Economic Differences in Fertility Control. Is There an Early Warning System at the Village Level? *European Journal of Population* (1990)

Hadeishi, H. "Economic Well-Being and Fertility in France: Nuits, 1744–1792." *Journal of Economic History* (2003)

Houdaille, J., "La mortalité des enfants dans la France rurale de 1690 a 1779," *Population,* (1984)

Houdaille, J. 'Fécondité des mariages dans le quart nord-est de la France de 1670 a 1829' . *Annales de Demographie Historique,* (1976)

Henry, L. Houdaille, J. **'**Fécondité …le quart nord-ouest' *Population (French Edition)*,(1973),

Henry, L. 'Fécondité …le quart sud-ouest de la France'. *Annales de Demographie Historique* (1972) and

Henry, L. 'Fecondite …le quart sud-est de la France', Population *(French Edition)*, (1978)**.**

Levy-Leboyer, M. and Bourguignon, F. *A Macroeconomic Model of France during the 19th Century: An Essay in Econometric Analysis* (1990)

Okun, B. "Evaluating Methods for Detecting Fertility Control: Coale and Trussell's Model and Cohort Parity Analysis" *Population Studies* (1994)

Schmertmann, C.P. "*Estimiating Parametric Fertility Models with Open Birth Interval Data"* http://www.demographic-research.org/Volumes/Vol1/5 (accessed 22 Jan 2008)

Stata Library, Analysing Count Data UCLA: Academic Technology Services, Statistical Consulting Group. from http://www.ats.ucla.edu/STAT/stata/library/count.htm (accessed 20 January 2008)
Weir, D. “New Estimates of Nuptuality and Marital Fertility in France, 1740-1911” *Population Studies* (1994)
Weir, D. “Family Income, Mortality, and Fertility on the Eve of the Demographic Transition: A Case Study of Rosny-Sous-Bois.” *Journal of Economic History* (1995)
Xie, Y. and Pimentel, E.E. “Age Patterns of Marital Fertility: Revising the Coale-Trussell Method”, *Journal of the American Statistical Association* (1992)