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THE PREVENTIVE CHECK IN MEDIEVAL AND PRE-INDUSTRIAL ENGLAND[1]

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ABSTRACT

England's post-Reformation demographic regime has been characterized as 'low pressure'. Yet the evidence hitherto for the presence of a preventive check, defined as the short-run response of marriage and births to variations in living standards, is rather weak. New evidence in this paper strengthens the case for the preventive check in both medieval and early modern England. We invoke manorial data to argue the case for a preventive check on marriages in the middle ages. Our analysis of the post-1540 period, based on parish-level rather than aggregate data, finds evidence for a preventive check on marriages and births.

THE PREVENTIVE CHECK IN MEDIEVAL AND PRE-INDUSTRIAL ENGLAND

When Thomas Robert Malthus first proposed his concept of the 'preventive check' in 1798 he believed that it described a mechanism prevalent across the socio-economic spectrum in England. The constraint on the birth rate, due to 'a foresight of the difficulties of rearing of a family', operated mainly through delayed marriage and increased rates of celibacy (Malthus 1798: chapter 4).[2]

Since the early 1980s several statistical studies have addressed Malthus' claim against historical evidence from England. All combine E. Anthony Wrigley and Roger Schofield's (1981) post-1540 demographic data with data on wheat prices or real wages. All find little if any impact of living standards on marriage rates (Lee 1981; Weir 1984; Bailey and Chambers 1993; Lee and Anderson 2001; Crafts and Mills 2009). This paper uses new data on medieval and early modern marriages and finds, by contrast, that a strong positive check operated.

To reconstruct medieval marriages we look at the annual number of merchets—fines paid by an unfree peasant for the lord's permission for a daughter to marry—on the manors of the Bishops of Winchester from 1269 to the arrival of the Black Death in 1348. We find a strong connection between changes in wheat prices and subsequent changes in the number of merchets paid. For smaller merchets, corresponding to less wealthy tenants, the relationship is negative: higher wheat prices deter marriages; whereas for

[2] Malthus did not envisage much of a role for the control of births within marriage, but this does not exclude a role for malnutrition-induced reductions in births.

larger merchets the relationship is positive, suggesting that episodes of high food prices that forced indebted peasants to sell off their holdings created opportunities for children of wealthier families to acquire the land they needed in order to marry. For both groups, in other words, there is a strong connection between economic conditions and nuptiality.

For the period 1540 to 1800 we use Wrigley and Schofield's population data but, whereas all existing studies use their aggregate estimates, we look at total marriages and births in the 404 parishes on which they based their reconstitution. We find a strong impact of real wages on marriages by half-century up to 1800, whereas the impact of wages on birth rates rises in the early eighteenth century, but disappears in the late eighteenth century.

The outline of the paper is as follows. Part 1 reviews the limitations of data on merchets as a proxy for marriages. Part 2 employs data on marriage fines in southern and eastern England and asks what they tell us about the preventive check. We find what we consider rather strong evidence of the preventive check for the relatively poor but not so for the better-off. Part 3 returns to the issue of the preventive check in England between the mid-sixteenth century and the end of the eighteenth century. Again it finds strong evidence of a preventive check. Part 4 concludes.

1. *Merchets and Marriages*

The merchet was a fine or tax paid by a dependent peasant for the lord's permission to marry a daughter.[3] It was not a means of legitimizing marriage, since after the Fourth Lateran Council (1215) a valid marriage required just two consenting adults. Indeed, it is quite likely that the manor was uninterested in marriages between couples with little or no wealth because such marriages were unpromising sources of revenue. The merchet was more akin to a stamp duty, a means of controlling inheritance and taxing peasant wealth, so its size varied with the likely value of the dowry. In the manorial court rolls studied by Eleanor Searle the value of merchets ranged between 5s and £4 when there was land involved, but usually between 6d to 2s in cases where land was not mentioned. Few cottagers appear in the records paying merchets (Searle 1979).

Several authors have cautioned against inferring marriage rates from merchets. Larry Poos and Richard Smith (1984) cite the implausibly the low marriage rate implied by the merchet data derived by Zvi Razi (1980) from the manorial records of Halesowen. Others have linked the tendency for the number of merchets to decrease over time to the collapse of the feudal system. There was a big falling off in the number of merchets processed by Spalding Priory after the 1390s and a similar pattern is evident in Sutton-in-the-Isle in Cambridgeshire (Jones 1998: 165; McGibbon Smith 2005). However, in Ramsey Abbey in the same county, the annual average number

[3] The demographic-historical literature on merchets includes May 1973; Searle 1979; Razi 1980; Bennett 1982; Brand *et al*. 1983; Poos and Smith 1994; Jones 1996, 1998; Mueller 1999 ; McGibbon Smith 2005.

of merchets was higher in the first half of the fifteenth century than in the early fourteenth.[4]

For two main reasons, then— selection bias problems for class and for period— merchets are an imperfect indicator of the total number of marriages. However, our focus here is not on the trend in marriages or the marriage rate, but on short-term variations in their number. As long as the likelihood of being recorded did not change erratically over time, the year-to-year movement in marriage fines may offer a rough guide—and no more than that—to the variation in marriages. On this basis, we have constructed an annual series of merchets paid on the sixty-five manors located on the estates of the bishopric of Winchester in southern England (Britnell 2003; Campbell 2003). We also analyse movements in marriage fines from two locations in eastern England.

Our main database, a series derived from the court rolls of the Winchester estate, refers to the pre-Black Death era (from the 1260s to the 1340s). The values of marriage fines by quartile are 12d, 24d, and 80d. At the bottom end, the relatively small number of very small fines—nine per cent of the total are for 6d, and there are 30 fines of zero, 17 of 1d to 5d—is consistent with the tendency to exclude poorer cottagers from merchets. At the top end, the maximum fine was 400s, and there were 149 fines of 100s or more. The fact that fines varied with wealth allows us to see how the

[4] Bennett (1982) counted 426 for 1398-1458 (with data for three years missing), or about seven per annum on average, whereas Edward Britton in an unpublished study cited by Bennett (1982: 240n6) identified 112 merchets for 1297-1337, or less than four per annum.

marriage patterns of different social groups responded to changing economic conditions by looking at changing numbers of large and small fines.

While data start in 1263, as in the case of inheritances (Kelly and Ó Gráda 2010) the marriage fine data appear to suffer from considerable under-reporting before 1269: large manors that always report some fines after this date often record zero before it. Our analysis therefore focuses on the period from 1269 to 1348. The five biggest Winchester manors (ranging from 432 to 589 marriage fines in total) account for 27 per cent of observations; the biggest eleven (with a minimum of 281 fines each) for 50 per cent; and the biggest twenty (with a minimum of 154 fines) for 71 per cent. Twenty-five smaller manors recorded between one and fifty fines in total.

Given that the payment of a marriage fine is almost invariably associated with land ownership, the number of marriage fines on a manor should equal or exceed the number of entry fines: if a couple marries and enters a holding the two will be equal, but the death of one spouse followed by remarriage of the survivor will cause marriages to exceed land transfers over the life cycle. In fact, the median number of merchets per inheritance fine was 0.8, with a correlation of 0.88 across manors, indicating the expected undercounting of marriages by merchets.

Figure 1 plots annual numbers of marriage fines, land transfers (inheritances, inter-familial transfers, and land sales between unrelated individuals) for the largest twenty manors from 1263 to 1348. An interesting feature of the data is the large number of inter-family land sales: about two

hundred annually versus 150 for inheritances, although inheritances involved larger plots: the median fine size is 80d for inheritances, compared with only 40d for intra-family transfers and 24d for inter-family transfers. Thus the typical sale was of a small plot of land, consistent with these smallholders being forced to sell in hard times. It is notable how land sales follow wheat prices, a possible indication that high wheat prices put the poor under pressure, forcing them to sell their holdings to repay debts to wealthier tenants. In plotting deaths measured by entry fines, the figure for the first Black Death year of 1348 is truncated at 250 (the actual figure is 1306) in order to keep all the other inheritance data from crushing along the bottom.

[Figure 1 about here]

2. *The Preventive Check in the Middle Ages:*

What factors determined marriage rates? The first, naturally, is real wages or food prices: in times when real wages fell, it took longer for couples to accumulate the target wealth felt necessary to independent to establish an independent household, so marriage rates should have fallen. However, for wealthier families engaged in commercial agriculture, high food prices would be a boon, causing marriage to be accelerated. In addition, as high food prices caused indebted smallholders to sell their land,

richer peasants would have had the opportunity to buy holdings to set their children up on.

The second factor is mortality: marriages rose as the widowed remarried, while the young inherited the property that would allow them to set up a household. For the manor of Halesowen, Razi (1980: 45-50) found that in years where 'mortality was high and many young villagers inherited land or husbands lost their wives, the number of marriages rose sharply' (1980: 47). However, Razi notes that the Great Famine of 1316-17 was exceptional in that 'although land was available and many husbands probably lost their wives, marriages had to be postponed' (1980: 47). The same failure of marriages to rise in 1316-17 can be seen in our Winchester data in Figure 1.

In what follows we assume the following simple log-linear Malthusian model:

$$\ln(M_t/N_t) = \beta_0 + \beta'_1\ln(w_t) + \beta'_2\ln(M_{t-1}/N_{t-1}) + \beta'_3\ln\ln(D_t/N_t) + \beta'_4\ln(X_t) \qquad [1]$$

where M are annual marriages, N is population, w is the real wage, D are annual deaths, and X are other variables, such as technology, public charity, and urbanization. The right hand side variables are vectors of current and lagged values. Taking first differences we have:

$$\Delta\ln(M_t) = \beta'_1\Delta\ln(w_t) + \beta'_2\Delta\ln(M_{t-1}) + \beta'_3\Delta\ln(D_t) + \beta'_4\Delta\ln(X_t) - (\beta_2 + \beta_3)'\Delta\ln(N_{t-1}) \qquad [2]$$

We assume that the relevant population of tenants with holdings large enough to make them liable to pay marriage fines is roughly constant so $\Delta N = 0$. This is broadly consistent with Figure 1. For annual differences we assume that the impact of changes of other factors X is negligible: it makes sense for the change in marriages from one year to the next to be affected by a change in real wages, but hardly by better technology or urbanization, although these variables can exert a strong influence over longer periods. We therefore estimate:

$$\Delta\ln(M_t) = \beta'_1\Delta\ln(w_t) + \beta'_2\Delta\ln(M_{t-1}) + \beta'_3\Delta\ln(D_t) \qquad [3]$$

Table 1 reports the results of regressing marriage fines on wheat prices and property transfers (the sum of inheritance taxes, sales, and intra-family transfers) for the twenty largest manors from 1269, when records become reliable, to 1347, the year before the Black Death. All variables are differences of logs, so the coefficients are elasticities. The first column refers to all marriages, the second to those involving fines of 24d or less, and the third to fines of over 24d.[5]

It can be seen that a high number of marriages in one year results in lower marriages in the next two years. The overall effect of the price of wheat on marriages is negative. Note, however, that for larger fines the impact of lagged fines is marginally positive. The contemporaneous

[5] Using a panel model where slopes were allowed to vary across manors did not alter the results substantially: these manors are concentrated in a small geographical area and represent a fairly homogeneous group of observations, in contrast to the parishes spread across England that we consider below.

elasticity was -0.1 for small fines and 0.01 for fines over 24d. The cumulative responses after a year were -0.21 and +0.23, respectively; after two years they were -0.54 for small fines and +0.40 for larger fines.[6] The cumulative estimate of -0.54 for poorer couples is strikingly high compared to those by Weir and others reported earlier for a later period. Table 1 also indicates that land transfers had no impact for smaller fines, but they had a large impact for larger fines.[7]

[Tables 1 and 2 about here]

The negative impact of wheat price on marriages for smaller fines supports the standard preventive check story as outlined above: as real income fell it took longer to save to reach target wealth for marriage, and so marriage was postponed. The evidence on wealthier peasants is more consistent with the finding by Razi (1980: 47) whereby in the wake of years

[6] Starting off with $m_t = \theta_1 m_{t-1} + \theta_2 m_{t-2} + \varphi_0 w_t + \varphi_1 w_{t-1} - \varphi_2 w_{t-2}$,

the elasticities (η_i, i = 0, … -2) are:

$\eta_0 = \varphi_0$

$\eta_1 = \theta_1\varphi_0 + \varphi_1$

$\eta_2 = \theta_1(\theta_1\varphi_0 + \varphi_1) + \theta_2\varphi_0 + \varphi_2$

Then the cumulative elasticity after two periods is $[\eta_0 + \eta_1 + \eta_2]$

[7] We also experimented with wheat yields but they produced coefficients that were small and insignificant. Similarly, multiplying yields by wheat prices to get a measure of the income of wealthier peasants who were producing grain for the market produced no meaningful results.

of high wheat prices (which drove up the price of other grains also) laborers with plots too small to support themselves were plunged into debt, forcing them to sell their holdings to the rich. This gave some more prosperous landholders an opportunity to marry off their daughters. We measure deaths in the regression by inheritance fines. However, as Figure 1 shows, inheritances are strongly correlated with other property transfers and by using total transfers (the sum of inheritances, intra-family transfers, and sales) the fit is slightly improved. We therefore report results for total transfers here.

The outcome predicated by Malthus corresponded closely to the 'European marriage pattern' proposed by John Hajnal (Hajnal 1965). Like Malthus, Hajnal equated marriage with a couple's economic independence. Since this involved the acquisition of both human and physical capital, marriage timing could be affected by economic shocks; marriage became 'a movable feast' (Wrigley *et al*. 1997: 125). A series of poor harvests might delay a farmer's ability to pay a daughter's dowry or his son's ability to accumulate the savings necessary to set out on his own.

Exactly when England adopted Hajnal's marriage pattern is still unclear.[8] Razi's pioneering study of the manor of Halesowen is sometimes interpreted as evidence against Hajnal's pattern. But Razi's finding that in a sample of 285 families living in Halesowen between 1280 and 1349 'at least 139 families (49 per cent) had a son or a daughter… who probably married between the ages of 18 and 22' is hardly conclusive evidence in

[8] On the link between Hajnal's pattern and economic growth see Foreman-Peck (2011).

favour of early marriage (Razi 1980: 63). On the other hand, Halesowen's poor, whose marriages were less likely to be recorded, probably married earlier than the better-off. Other studies argue for later marriages. For example, H. E. Hallam's analysis of data on the Lincolnshire Fenlands produced estimated mean ages at marriage (22.4 years for women and 25.9 years for men) that fitted the European marriage pattern. On the basis of a range of evidence drawn from poll taxes, marriage fines, and other sources Richard Smith hypothesizes that the Hajnal regime emerged 'as early as the 1260s' while Jeremy Goldberg suggests that it 'may have developed most precociously in the towns and cities'. However the available data on marriage age are too patchy for definitive judgments (Hallam 1985; Smith 1983, 1999: 41-44; Goldberg 2006: 426-27; Razi 1980: 60-64; Bailey 1996). Even less is known about mean marriage age in the fifteenth and sixteenth centuries. By the early seventeenth century mean ages at first marriage were over 27 years for men and 25 years for women (Wrigley *et al*. 1997: 134).

2.1. *Property Transfers:*

Table 2 reports regressions of inheritances and land sales on wheat prices, all variables again differences of logs. It can be seen that rises in wheat prices have a strong impact on mortality in the current and following year, with an elasticity in each case of around 0.25. For sales of land between families, high wheat prices one year increase sales next year with an elasticity of 0.5.

2.2. *Halesowen and Ramsey Abbey:*

Razi (1980: 48, 133) presents data on marriage fines in Halesowen for 1293-1400, but with data missing for 1296, 1303, 1360, 1365, 1366, and only one observation after 1385. He claimed that in Halesowen peasants married 'only when they had land', which meant that for the rich the wait might not be as long as for the poor (1980: 56, 60). Table 5 reports the results of regressing marriage fines on wheat prices in Halesowen for 1293-1384. The more robust wheat price regression finds that high wheat prices had a strong negative impact on fines.[9]

Judith Bennett's merchet data from Ramsey Abbey in the Cambridgeshire fenlands cover a later period (1398-1457, but with data missing for 1401-03). The annual number of marriage fines in Ramsey rose with wheat prices, as was the case with larger fines on the Winchester estate. At first sight the positive coefficient on wheat price is surprising, but it would make sense if by this time only well-off villains paid marriage fines, since such individuals were likely to have been net producers of grain and beneficiaries of forced land sales by the poor. Thus high prices could

[9] Razi also proposed an alternative merchet series which attempted to correct for missing evidence, but since this did not yield better results, the outcome is not reported here.

have enhanced the marriage opportunities of those who with purchasing power to spare.

[Table 3 about here]

3. *Post-1541: Marriages*

As noted in the introduction, several previous studies have addressed the link between marriages, births, and living standards in early modern England. Those studies rely exclusively on the aggregate demographic data published in Wrigley and Schofield (1981). Our approach here differs in that it applies multi-level regression analysis to the 404 individual parishes constituting the Cambridge Group database for five sub-periods from 1539-1600 to 1751-1800, as in an earlier study of the impact of living standards on deaths (Kelly and Ó Gráda 2010). This increases the number of observations considerably, and allows us to see how marriage patterns varied across parishes. Coverage improves over time, as the proportion of parishes with the relevant records intact rises. In the absence of long-run data on regional wages, living standards are proxied by the national real wage series for agricultural laborers provided by Clark (2007). As above, variables are in differences of logs so that the estimated coefficients may be interpreted as elasticities.

Because we have data for individual parishes we can estimate a multilevel regression, allowing the impact of wages and past marriages to vary across parishes:

$$\Delta \ln(M_t) = (\beta_1 + \beta_{1j})' \Delta \ln(w_t) + (\beta_2 + \beta_{2j})' \Delta \ln(M_{t-1}) \quad [4]$$

where the vector of random effects across parishes $\beta_j = (\beta'_{1j}, \beta'_{2j})' \sim N(0, \Sigma\beta_j)$ (Bates 2010).

The outcome in Table 3 shows that current wages and wages lagged one and two years had a very strong impact on marriages throughout. The cumulative responses of marriages up to three lags are reported in Table 4. Before 1700 the cumulative impact peaked one year later; thereafter the peak occurred two years later. Overall, the short-term response was strongest in 1650-1699, but the high cumulative impact in 1700-1749 corroborates our earlier finding that this was a challenging half-century in demographic terms. Deaths, by contrast to the medieval data, had virtually no impact on marriages. This may reflect greater economic opportunities, or simply the fact the medieval data are restricted to moderately prosperous farming households whereas the later data include all marriages.

The preventive check is a good deal stronger than that found in earlier studies based on national totals. Weir (1984) estimated the cumulative responses of marriages to wheat price at +0.099 in 1640-1739 and -0.113 in 1740-49; the cumulative responses of fertility were -0.050 and -0.164, respectively. Bailey and Chambers (1993: 357-358), using the real wage series constructed by Henry Phelps Brown and Sheila Hopkins (1961) rather than wheat prices, reported elasticities of births to real wages at between 0.2 to 0.3 and elasticities of the marriage rate at roughly half that

for sub-periods between 1542 and 1800. Nicholas Crafts and Terence Mills (2009), using Clark's real wage data and state space techniques, could find no evidence for the preventive check after the mid-seventeenth century. All told, these estimates imply a rather weak preventive check; indeed, Weir (1984: 43) was struck by how 'at no time between 1670 and 1830 were marriages less responsive to economic shocks in France than in England'.

[Tables 4 and 5 about here]

3.1. *Post-1541: Births*

The outcome for births, described in Table 5, resembles that for marriages. The impact of variations in real wages on births before 1750 was quite powerful. The cumulative impact, described in Table 6, increased during the first half of the eighteenth century, as with deaths (Kelly and Ó Gráda 2010); indeed it was strongest in that half-century. The strong preventive check recorded in 1700-1749 probably reflects the impact of significant subsistence crises in 1728-30 and 1740-42 (Kelly and Ó Gráda 2011). Again the estimated cumulative responses reported here are much stronger than those estimated by David Weir (1984: 38, 42) or Ronald Lee and Michael Anderson (2001: Table 2).

Figures 2a and 2b describe the sum of wage coefficients by parish in each half-century for marriages and births. A notable feature in both cases is how much the strength of the preventive check in individual parishes varied through time before the mid-eighteenth century: individual lines

representing parishes frequently cross, so that many parishes with a strong (weak) check in one period have a weak (strong) check in the next. The variation across parishes in both responses diminished in the eighteenth century. The patterns are geographically random through time, however. We discovered no correlation between the strengths of the positive and preventive checks across parishes (compare Kelly and Ó Gráda 2010).

[Figures 2a and 2b about here]

[Tables 6 and 7 about here]

4. *Conclusion*

Wrigley and Schofield's path-breaking research on English population history emphasized the 'low pressure' character of the demographic regime. It built on and confirmed the presence of Hajnal's European marriage pattern and Malthus's preventive check. It is ironic, then, that econometric studies employing Wrigley and Schofield's annual data series lent but weak support to the presence of a preventive check, when defined as the short-run response of marriage and births to variations in proxies for the standard of living.

The new evidence produced in this paper strengthens the case for the preventive check in both medieval and early modern England. Our reliance on merchets as a proxy for tracking short-run fluctuations in marriages in the medieval era is open to criticism, but the outcome can be defended as coherent. Its implication of the presence of a preventive check on marriages for poorer tenants is plausible, and its tentative finding that

better-off tenants may have benefited from poor harvests interesting. Our analysis of the post-1540 period is based on the same data as previous analyses, but our study differs in that employs that data at parish level rather than in aggregate. The outcome offers rather clear-cut evidence of a stronger preventive check on marriages and births than found in those studies using aggregate data. Our next step is to discover how the strength of the check varied by socio-economic status.

Table 1. Regressions of annual marriages by manor on wheat prices and land transfers, 1269-1347

	All	Below 24d	Above 24d
Intercept	0.003 (0.026)	-0.023 (0.034)	0.021 (0.033)
Lag Marriages	-0.648 ** (0.037)	-0.651 ** (0.046)	-0.595 ** (0.052)
Lag2 Marriages	-0.253 ** (0.036)	-0.261 ** (0.046)	-0.238 * (0.05)
Price	-0.209 * (0.089)	-0.102 (0.144)	0.014 (0.11)
Lag Price	0.042 (0.09)	-0.172 (0.117)	0.225 * (0.112)
Lag2 Price	-0.273 ** (0.1)	-0.256 ** (0.127)	-0.043 (0.122)
Transfers	0.149 ** (0.048)	0.0034 (0.067)	0.217 ** (0.064)
Lag Transfers	0.052 (0.05)	0.091 (0.066)	-0.007 (0.067)
N	664	442	344
RMSE	0.669	0.701	0.605
Rsq	0.345	0.321	0.345

Regressions of annual marriage fines by manor on lagged fines, wheat prices, and number of land transfers. All variables are differences of logs. The second column uses fines of 24d or less, the third uses fines over 24d. Standard errors in parentheses. ** denotes a coefficient significant at 1 per cent.

Table 2. Regressions of annual inheritances and land sales on wheat prices, 1269-1347

	Inheritances	Land Sales
Intercept	-0.01 (0.025)	-0.023 (0.027)
Lag	-0.667 ** (0.035)	-0.577 ** (0.039)
Lag2	-0.351 ** (0.036)	-0.284 ** (0.038)
Price	0.253 ** (0.085)	0.115 (0.091)
Lag Price	0.235 ** (0.084)	0.515 ** (0.09)
Lag2 Price	-0.051 (0.096)	0.051 (0.103)
N	708	628
RMSE	0.664	0.669
Rsq	0.352	0.284

Regressions of annual inheritances and inter-family land transfers on wheat prices and lagged value of each dependent variable. All variables are differences of logs. ** denotes a coefficient significant at 1 per cent.

Table 3. Regressions of Merchets on Wheat Prices and Real Wages in Halesowen and Ramsey Abbey

	Halesowen	Ramsey
Intercept	0.035 (0.109)	-0.080 (0.083)
Lag Merchet	-0.657 ** (0.135)	-0.834 ** (0.130)
Lag2 Merchet	-0.265 * (0.148)	-0.449 ** (0.119)
Price	-0.599 * (0.363)	0.540 * (0.304)
Lag Price	-0.987 ** (0.352)	0.485 (0.304)
Lag2 Price	0.156 (0.399)	0.342 (0.305)
N	50	51
Period covered	1293-1384	1398-1457
Adjusted Rsq	0.381	0.465
Prob>F	0.0001	0.0000

Regressions of manorial fines on wheat prices and lagged values of both variables. All variables are differences of logs. ** denotes a coefficient significant at 1 per cent; * significant at 5 per cent.

Table 4. Regressions of annual marriages by parish on real wages and mortality, 1539-1800

	1600	*1650*	*1700*	*1750*	*1800*
Lag Marriage	-0.685**	-0.706**	-0.639**	-0.675**	-0.720**
	(0.011)	(0.008)	(0.008)	(0.008)	(0.007)
Lag2 Marriage	-0.452**	-0.476**	-0.409**	-0.435**	-0.473**
	(0.013)	(0.01)	(0.009)	(0.009)	(0.008)
Lag3 Marriage	-0.232**	-0.235**	-0.222**	-0.218**	-0.239**
	(0.011)	(0.008)	(0.008)	(0.008)	(0.007)
Wage	0.366*	0.487**	0.353**	0.413**	0.437**
	(0.059)	(0.05)	(0.039)	(0.053)	(0.063)
Lag Wage	0.410**	0.611**	0.635**	0.246**	0.248**
	(0.063)	(0.049)	(0.044)	(0.056)	(0.071)
Lag2 Wage	0.146*	0.208**	0.358**	0.227**	0.182**
	(0.063)	(0.051)	(0.042)	(0.054)	(0.07)
Lag3 Wage	-0.011	0.095	0.082**	-0.006	0.043
	(0.057)	(0.05)	(0.039)	(0.051)	(0.076)
Death	0.009	0.008	0.013	-0.027**	-0.016
	(0.013)	(0.01)	(0.011)	(0.01)	(0.01)
Lag Death	0.05**	0.035**	0.044**	0.004	0.016
	(0.014)	(0.011)	(0.013)	(0.011)	(0.011)
Lag2 Death	0.06*	0.027**	0.041**	0.018	0.009
	(0.013)	(0.01)	(0.011)	(0.01)	(0.01
Loglik	-6284.3	-11051.1	-12598.2	-12892	12234.1
N	7,423	13,474	14,545	15,989	17,678
Parishes	285	377	400	403	403

Multi-level regression of annual marriages on real wages and mortality. Each column is for the period ending on the date listed. All variables are differences of logs. Standard errors in parentheses. ** denotes a coefficient significant at 1 per cent.

Table 5. Cumulative response of marriage to wages, 1540-1800

Lag	*1600*	*1650*	*1700*	*1750*	*1800*
0	0.399	0.487	0.353	0.413	0.437
1	0.525	0.754	0.762	0.380	0.370
2	0.397	0.541	0.715	0.455	0.393
3	0.112	0.215	0.392	0.291	0.240

Table 6. Regressions of annual births by parish on real wages and marriages, 1539-1800

	1600	*1650*	*1700*	*1750*	*1800*
Lag Birth	-0.776 ** (0.012	-0.784 ** (0.008)	-0.75 ** (0.008)	-0.809 ** (0.008)	-0.813 ** (0.007)
Lag2 Birth	-0.451 ** (0.013)	-0.475 ** (0.01)	-0.432 ** (0.009)	-0.473 ** (0.009)	-0.453 ** (0.009)
Lag3 Birth	0.164 ** (0.011)	-0.181 ** (0.008)	-0.175 ** (0.008)	-0.187 ** (0.008)	-0.176 ** (0.007)
Wage	0.140 ** (0.032)	0.201 ** (0.028)	0.212 ** (0.022)	0.198 ** (0.031)	0.112 ** (0.033)
Lag Wage	0.282 ** (0.037)	0.456 ** (0.03)	0.331 ** (0.022)	0.36 ** (0.029)	0.213 ** (0.038)
Lag2 Wage	0.285 ** (0.039)	0.225 ** (0.027)	0.224 ** (0.023)	0.183 ** (0.031)	0.001 (0.036)
Lag3 Wage	0.073 ** (0.033)	0.087 ** (0.025)	0.015 (0.021)	0.219 ** (0.028)	0.01 (0.038)
Marriage	0.012 (0.007)	0.012 ** (0.004)	0.016 ** (0.004)	0.01 ** (0.004)	0.012 ** (0.004)
Lag Marriage	0.043 ** (0.008)	0.040 ** (0.005)	0.04 ** (0.005)	0.046 ** (0.005)	0.034 ** (0.005)
Lag2 Marriage	0.043 ** (0.008)	0.030 (0.005)	0.034 ** (0.005)	0.046 ** (0.005)	0.031 ** (0.005)
Lag3 Marriage	0.029 ** (0.007)	0.026 ** (0.004)	0.021 ** (0.004)	0.028 ** (0.004)	0.022 ** (0.004)
Loglik	-2219.8	-2325.6	-3550	-2589.8	-618
N	7,272	13,748	14,639	16,062	17,777
Parishes	282	374	400	402	403

Multi-level regression of annual births on real wages and mortality. Each column is for the period ending on the date listed. All variables are differences of logs. Standard errors in parentheses. ** denotes a coefficient significant at 1 per cent.

Table 7. Cumulative response of births to wages, 1540-1800

Lag	*1600*	*1650*	*1700*	*1750*	*1800*
0	0.140	0.201	0.212	0.198	0.112
1	0.313	0.499	0.384	0.398	0.234
2	0.402	0.395	0.381	0.326	0.085
3	0.328	0.258	0.320	0.508	0.161

Figure 1. Marriage Fines and Land Transfers, 1263-1348.

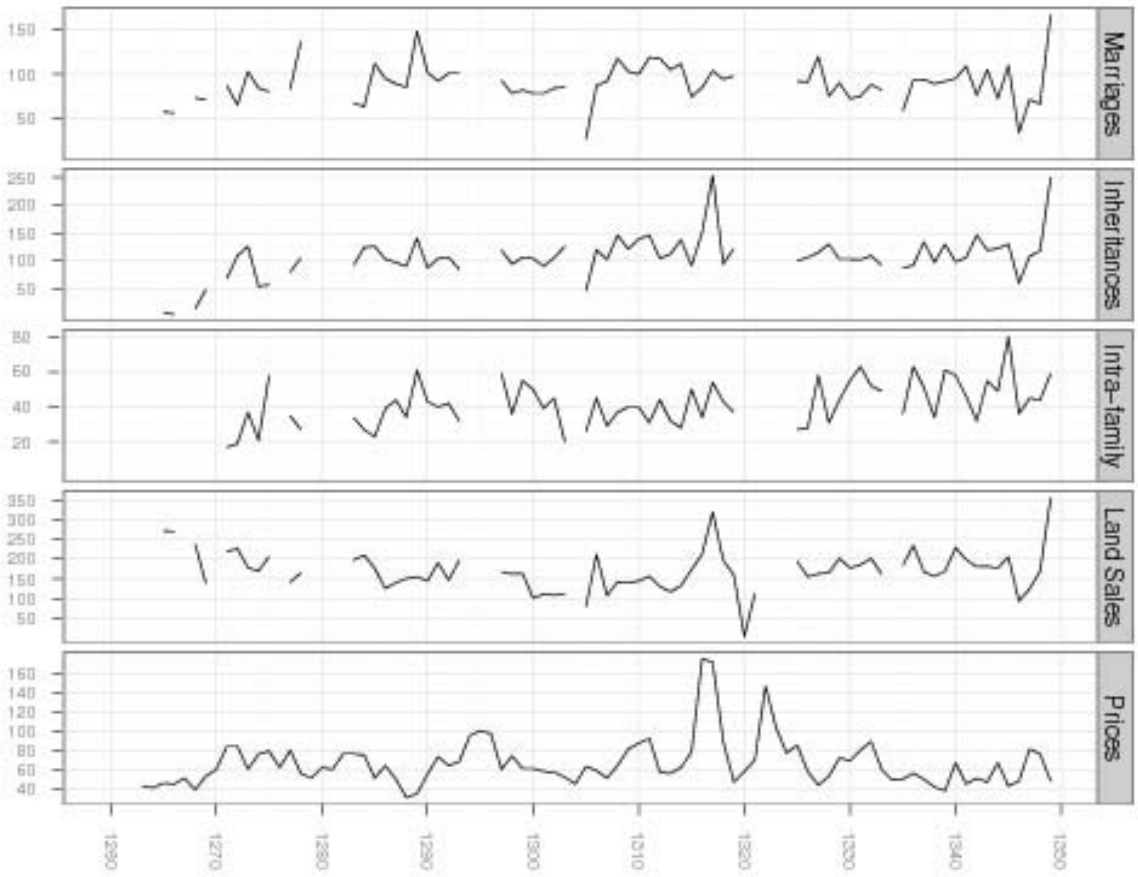


Figure 2a. Marriages: Wage Coefficients by Parish.

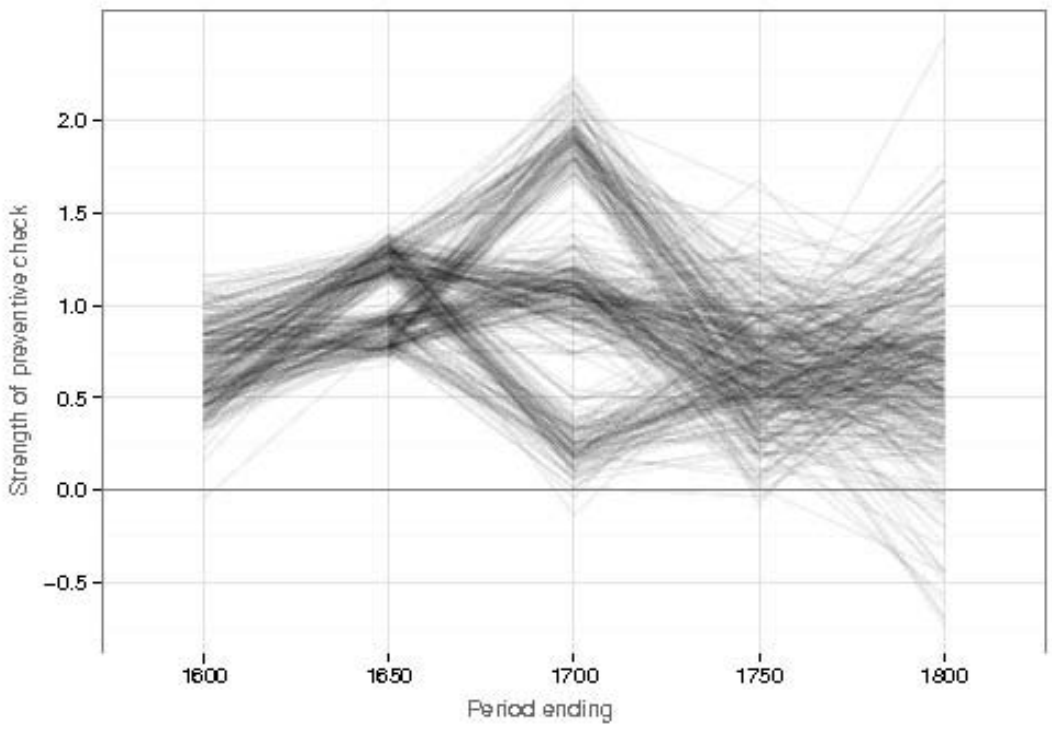
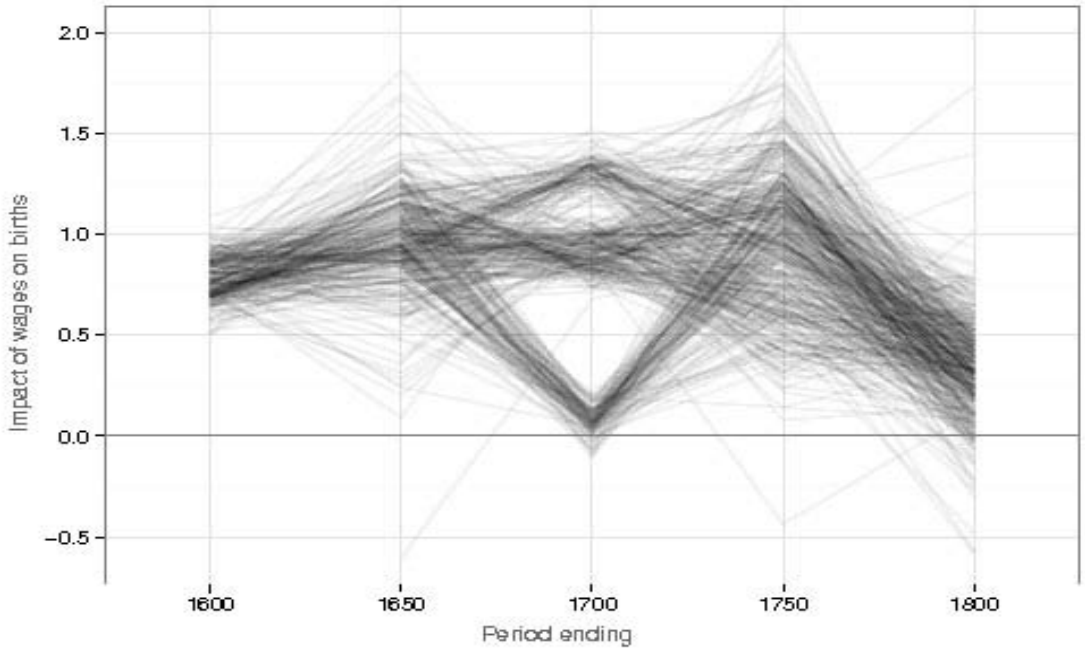


Figure 2b. Births: Wage Coefficients by Parish



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