SUPPLEMENTARY MATERIAL

Economic development, female wages and missing females births in Spain, 1900-1930

APPENDIX A

TABLES

Table A1 Sex ratio at birth. Inference for sharp design at 1920. Province-year data, Spain.

	Average SRB Left of 1920	Average SRB Right of 1920	Diff. in means	Window observations
Window [1917, 1923]	1.093	1.091	-0.002	343
Window [1916, 1924]	1.094	1.089	-0.005	441
Window [1915, 1925]	1.096	1.088	-0.008*	539
Window [1914, 1926]	1.095	1.087	-0.008**	637

* p < 0.1, ** p < 0.05, *** p < 0.01. P-values correspond to randomization-based test of Neyman (Large sample). The cut-off point is 1920.

Table A2. Wage differentials in manual low-status labourers (*braceros*) in Spain between the 1910s and 1920s.

Wages	Mean (1914-1920)	Mean Diff. (1921-1931)
	(1)	(2)
Average daily real wages		
Male. Harvest	3.956 [2.240]	2.912*** (0.146)
Male, Winter	2.632 [1.466]	1.903*** (0.088)
Female, Harvest	2.074 [0.850]	1.424*** (0.088)
Female, Winter	1.367 [0.607]	0.843*** (0.064)

Notes: Column (1) reports the average daily real wages and gaps. Standard deviations are in brackets. Columns (2) shows the average difference between the first (1914-1920) and the second (1921-1931) study periods. Robust standard errors in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01.

Table A3. Real wages of manual low-skilled male labourers. Provinces, Spain, 1914-1931

	Winter		Harvest	
	(1)	(2)	(3)	(4)
Wages, F	0.711***		0.832***	
	[0.119]		[0.177]	
Inf. mort., M	-0.478	-0.326	3.311	1.544
	[3.147]	[2.832]	[5.972]	[4.958]
Report m w only		0.204		-0.201
		[0.165]		[0.254]
Constant	1.263**	1.910***	0.936	2.676***
	[0.487]	[0.436]	[1.091]	[0.778]
Province FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
Observations	389	722	393	727
R-squared	0.847	0.711	0.810	0.632
Within R2	0.735	0.607	0.702	0.517

Notes: Clustered standard errors at province level in brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable is the male wages in winter in columns (1) and (2), and the corresponding wages in harvest season in columns (3) and (4). Similarly, Wages F is the female wages in winter in columns (1) and (2), and the female wages in harvest season in columns (3) and (4). Report m w only refers to province-years that reported male wages only. Columns (1) and (3) use the sample of province-years that reported both male and female wages, and columns (2) and (4) the sample of province-years that released male wages, regardless of whether or not they reported female ones. R-squared includes the variation explained by province and year variables.

Table A4. Summary statistics of sample in tables 2 and 3. Spain, 1900-1930.

	Obs.	Mean	St. Dev.	Min	Max
	(1)	(2)	(3)	(4)	(5)
Sex ratio at birth	192	1.089	0.042	1.036	1.282
Male infant mortality	192	158.7	41.4	71.9	286.1
Urbanisation (%)	192	29.0	21.4	0	83.4
GDP per capita (000000)	192	0.558	0.223	0.216	1.593
Agriculture (%)	192	64.9	16.4	9.0	92.8
Manufacturing (%)	192	16.7	9.1	2.4	58.6
Literacy, male (%)	192	68.5	19.2	30.7	100
Family size: children per household	192	0.998	0.130	0.669	1.477
Family type: adult women (aged 26-70) per household	192	0.929	0.093	0.796	1.173

Note: The period under analysis included information from the census years: 1900, 1910, 1920 and 1930.

Table A5. Summary statistics of sample in table 4. Spain, 1914-1920.

	Obs.	Mean	St. Dev.	Min	Max
	(1)	(2)	(3)	(4)	(5)
Panel A *(Winter)*					
Sex ratio at birth	152	1.090	0.046	0.992	1.273
Male infant mortality	152	0.159	0.038	0.065	0.268
Real wages, M	152	2.393	1.044	0.984	10.381
Real wages, F	152	1.189	0.474	0.264	3.088
Panel B *(Harvest)*					
Sex ratio at birth	154	1.090	0.046	0.992	1.273
Male infant mortality	154	0.160	0.038	0.065	0.268
Real wages, M	154	3.506	1.422	1.224	11.180
Real wages, F	154	1.800	0.645	0.764	3.881

Table A6. Sex ratio at birth and Average Wages. Province-years reporting sex specific wages, Spain, 1921-1931

	(1)	(2)	(4)	(5)
	Winter		Harvest	
Wages, M	0.002		0.000	
	[0.002]		[0.001]	
Wages, F		0.001		-0.000
		[0.004]		[0.002]
Inf. Mort, M	0.042	0.039	0.031	0.035
	[0.130]	[0.137]	[0.131]	[0.131]
Constant	1.083***	1.087***	1.088***	1.089***
	[0.022]	[0.018]	[0.020]	[0.018]
Prov. FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
Observations	237	237	239	239
R-squared	0.702	0.701	0.699	0.699
Within R-squared	0.138	0.136	0.135	0.135

Notes: Clustered standard error at province level in brackets. * p < 0.1, ** p < 0.05, *** p < 0.01. Dependent variable is the SRB. Wages, M is the average daily real wages of male manual low-status labourers (columns 1&2 winter wages, columns 3&4 harvest wages). Wages, F is the same wage measure, but for female labourers. Inf. Mort, M is the proportion of male children who died before their first birthday. R-squared includes the variation explained by province and year variables.

Table A7. Balance between wage-reporting groups. Spain, 1914-1931

	Means	Differences between wage-reporting groups	
	Male & female wages	Male wages	No wages
	(1)	(2)	(3)
Stem	0.267	-0.014	-0.011
	[0.443]	(0.038)	(0.041)
SRB	1.083	0.002	0.001
	[0.040]	(0.004)	(0.004)
Under 1 mort, all	0.135	-0.002	0.008*
	[0.036]	(0.003)	(0.003)
Under 1 mort, male	0.143	-0.002	0.008*
	[0.040]	(0.003)	(0.003)
Under 1 mort, female	0.126	0.002	0.008*
	[0.035]	(0.003)	(0.003)
GDP	0.232	0.004**	-0.004*
	[0.024]	(0.002)	(0.002)
Observations	389	722	160

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Column (1) reports the average characteristics for the group of province-years for which information on female and male wages was released. Standard deviations are in brackets. Columns (2) and (3) show the average difference between column (1) and the group of province-years that reported male wages regardless of the reporting of female wages, and the group of province-years for which neither female nor male wages were released. R-squared includes the variation explained by province and year variables.

Table A8. Summary statistics of sample in table 5. Spain, 1914-1920.

	Obs.	Mean	St. Dev.	Min	Max
	(1)	(2)	(3)	(4)	(5)
Sex ratio at birth	279	1.095	0.053	0.992	1.319
Male infant mortality	279	0.166	0.040	0.065	0.273
Real wages, M (harvest season)	279	3.424	1.743	1.223	18.313
Real wages, M (winter season)	279	2.286	1.123	0.693	10.988
Nuclear	279	0.745	0.436	0	1
Gendered reporting	279	0.455	0.499	0	1

FIGURES

Figure A1 Sex ratio at birth, Province variation, 1900-1930

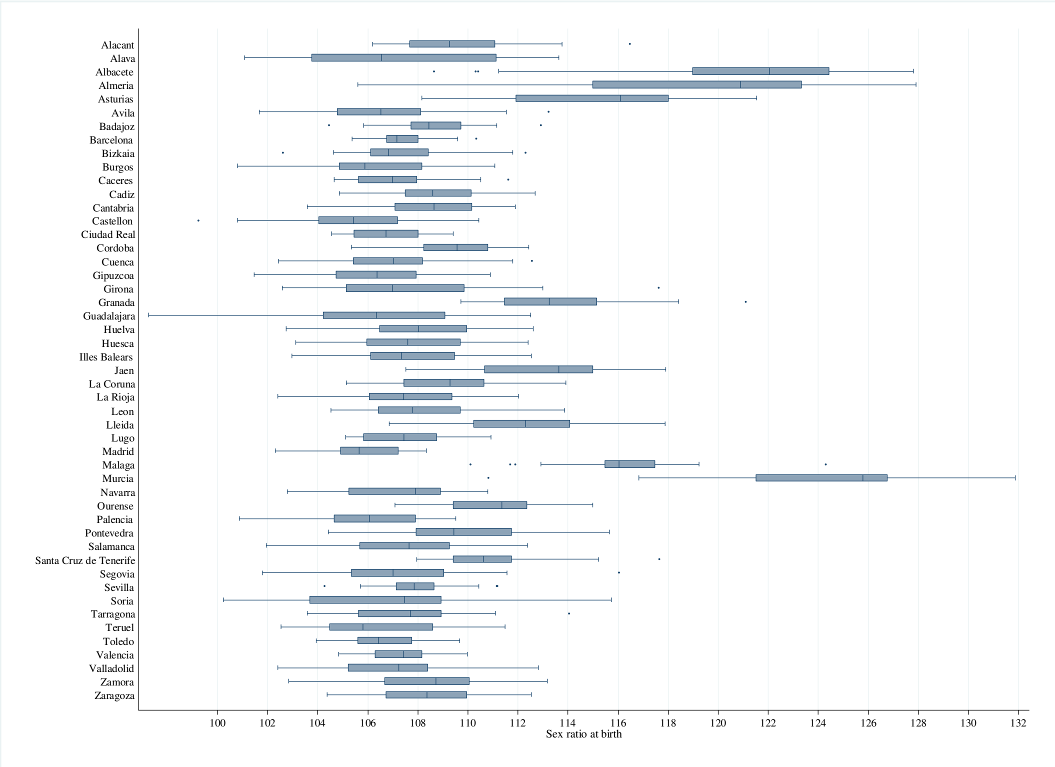


Figure A2. Report of female wages

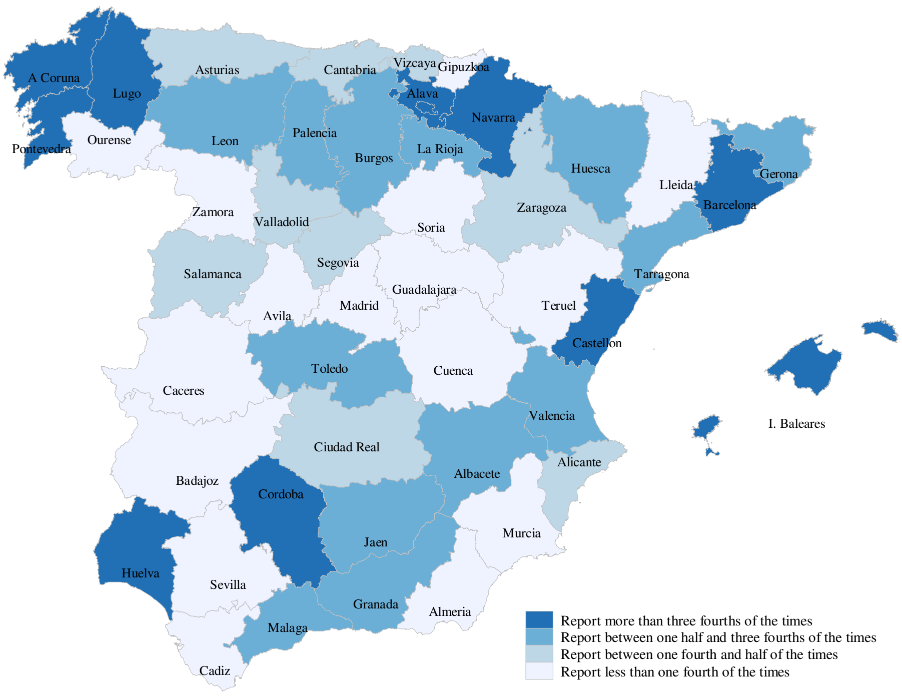


Figure A3. Infant mortality rates and sex ratios at birth, 1900-1930

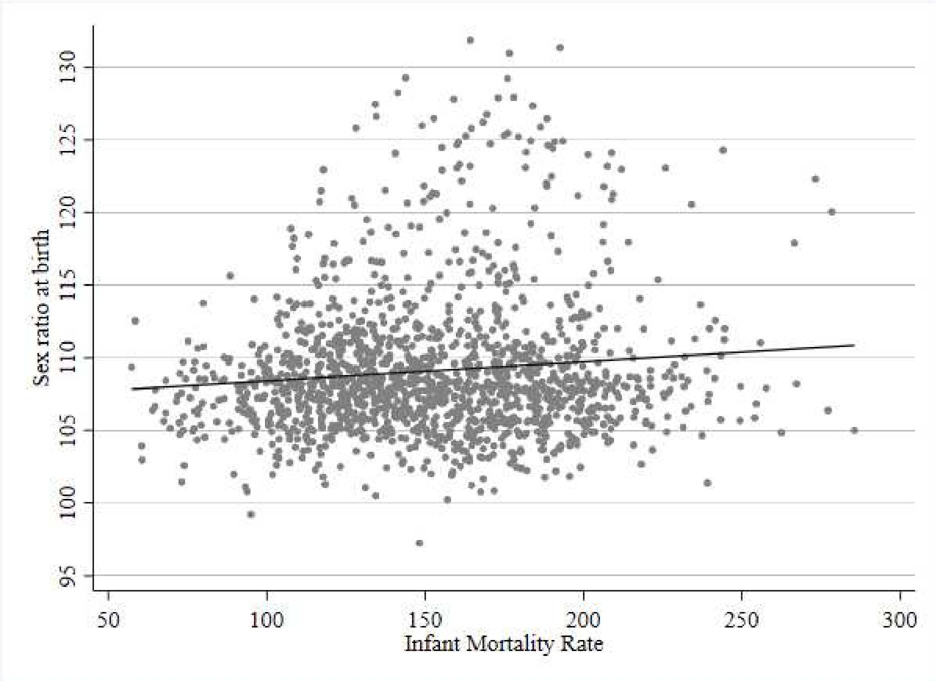
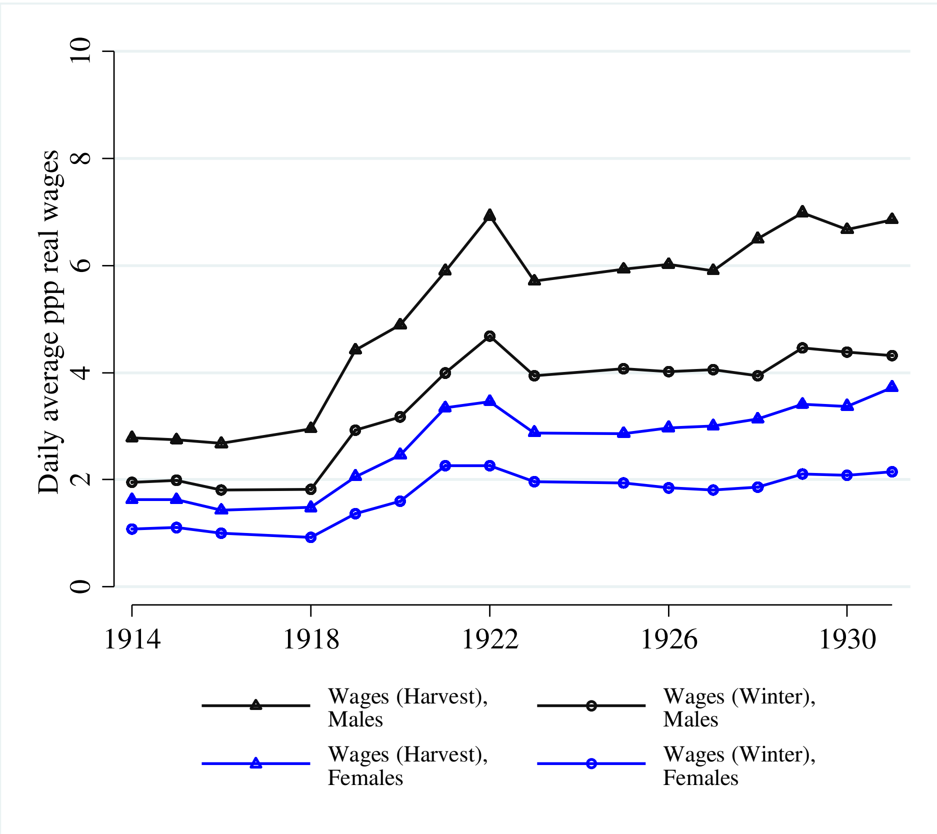


Figure A4. Manual low-status labourers (*braceros*) real wages. Spain, 1914-1931.



APPENDIX B

CONCEPTUAL FRAMEWORK

To facilitate the analysis and interpretation of the relationship between wages and sex ratio at birth (SRB) in each province year, we modify the fertility model proposed by Lin et al. (2014) to accommodate it to our context. The framework considers a family where a new member is about to be born. The birth of a new member is assumed to provide the family with a payoff if the child is born alive and zero payoff otherwise. Specifically, the payoff is modelled as the difference between the value of having the child, θ, and the costs of raising the child, Ψ, and this difference is weighted by the effort devoted to fighting for the child's survival, e. Thus, the payoff of a live birth is modelled as: $(\theta - \Psi)e$.

In Lin et al. (2014), son preference is measured by the difference between the value that variable θ takes when the child is a boy and the value it takes when the child is a girl: $\theta = \theta^*$ if the new member is a boy, and $\theta = \theta^* - \mu$, with $\theta^* > \mu > 0$, if the child is a girl. We use this same approach and refine costs to accommodate the characteristics of our setting. Specifically, the cost of raising a child is determined by nurturing costs, Ψ^*, and if the child survives for the first 24 hours, it includes the cost of registering the new birth. Formally, $\Psi = \Psi^*$ when the baby is less than 24 hours old and $\Psi = \Psi^* + \tau$ otherwise, with $\Psi^*, \tau > 0$.

Finally, as an extension to the Lin et al. (2014) framework, and to account for stylized facts in the literature, we account for the possibility that the costs of raising children are relative to the family's income, measured by wages, $w>0$. On the one hand, nurturing costs seem to be relatively lower for richer families than for poorer ones (Das Gupta and Shuzhuo 1999, Beltrán Tapia and Marco-Gracia 2022). Thus, we represent nurturing costs using a strictly decreasing and convex function of wages, $\Psi^*(w)$ with $\frac{d\Psi^*}{dw} < 0$ and $\frac{d^2\Psi^*}{dw^2} > 0$. On the other hand, the cost associated with registering a new birth results from a single time-consuming activity: one family member (usually the father) will spend time going to the registry instead of spending that time contributing to the family's income. The nature of registration costs is then captured by a strictly increasing function of wages, $\tau(w)$ with $\frac{d\tau}{dw} > 0$.

In this scenario, families decide the level of effort. For simplification, Lin et al. (2014) assume that there are two levels of effort: $e = \{e_l, e_h\}$, with $e_h > e_l > 0$. We follow the same approach, and in our context, the outcomes are interpreted as follows: A low effort, e_l, is detrimental to child survival, reducing it with respect to biologically expected figures. Additionally, a low effort implies the failure to register the child if the effort decision is taken more than 24 hours after birth. A high effort, e_h, allows the child to survive as biologically expected and, if it is older than 24 hours old, it implies its birth registration.

To find the effort level that optimizes the family's payoff at a given moment, it is possible to solve the problem by backward induction. That is, once we know the sex and wages paid in a society, it is possible to know the level of θ and Ψ. If $\theta > \Psi$, the child provides a positive payoff to the family, and the greater the effort, the greater the payoff. The family will therefore choose high effort, e_h. However, if $\theta < \Psi$, then the greater the effort, the smaller the payoff, and the family will thus choose low effort, e_l.

Population level effects of changes in wages

Families choosing low effort, e_l, for girls but not for boys results in a bias with respect to biologically expected demographic outcomes, such as in the SRB. In what follows, we use our framework to examine the direction and change in the SRB with changes in wages. We use the superscript t to denote if this variable is observed before, $t = 0$, or after, $t = 1$, the incurrence of registration costs.

Let us assume that preferences, costs, and wages are continuously distributed in a society and let us denote population average level variables using horizontal bar symbols (i.e., son preference, $\bar{\mu}$, costs of raising children, $\bar{\Psi}$, nurturing costs, $\bar{\Psi}^*$, registration costs, $\bar{\tau}$, and wages, $\bar{w}$). We know that changes in wages will lead to changes in the SRB only if wage variation modifies the proportion of families that choose low effort for the care of their female babies, denoted by $F(\bar{\mu}, \bar{\Psi})$, where $F: \mathbb{R}_+^2 \rightarrow [0,1]$ and it is strictly increasing in its arguments: $\frac{\partial F(\bar{\mu},\bar{\Psi})}{\partial \bar{\mu}}, \frac{\partial F(\bar{\mu},\bar{\Psi})}{\partial \bar{\Psi}} > 0$. Then, without loss of generality, SRB^t can be modelled as:

$$SRB^t = \alpha^t + \gamma F(\bar{\mu}, \bar{\Psi}^t), \tag{A1}$$

where parameter $\alpha^t > 0$ captures the biologically expected value of the SRB in t, and parameter $\gamma > 0$ captures the capacity of low effort to move SRBs away from their biologically expected value. The difference between biologically expected values before and after the incurrence of registration costs, $\alpha^1 - \alpha^0 < 0$, responds to the biological strength of female babies relative to that of males (Peacock et al. 2012). Let us focus on the subset of functions, *F*, that are additively separable and linear in its arguments; then, we rewrite:

$$SRB^t = \alpha^t + \gamma_1 \bar{\mu} + \gamma_2 \bar{\Psi}^t, \tag{A2}$$

where parameters $\gamma_1, \gamma_2 > 0$ capture the effect of son preferences and the cost of raising female children on the SRB in t. Furthermore, remember that: $\bar{\Psi}^t = \bar{\Psi}^*$ if $t = 0$, and $\bar{\Psi}^t = \bar{\Psi}^* + \bar{\tau}$ if $t = 1$ with $\frac{d\bar{\Psi}^*}{d\bar{w}} < 0$, $\frac{d^2\bar{\Psi}^*}{d\bar{w}^2} > 0$, and $\frac{d\bar{\tau}}{d\bar{w}} > 0$. We assume that $\frac{d\bar{\tau}}{d\bar{w}}$ is constant, and we denote it by c. Although the results are valid for any functional form that satisfies these conditions, let us assume that:

$$\bar{\Psi}^t(\bar{w}) = \begin{cases} a^{-b\bar{w}}, & if\ t = 0 \\ a^{-b\bar{w}} + c\bar{w}, & if\ t = 1 \end{cases} \tag{A3}$$

where parameters $a > 1$ and $b > 0$ to guarantee $\frac{\partial \bar{\Psi}^*}{\partial \bar{w}} < 0$, and $c > 0$, but as small as necessary to capture the fact that this is a non-core duty, which can be delayed.

Result 1. Consider a society satisfying the conditions in our framework. Then, $\frac{\partial SRB^t}{\partial \bar{w}} < 0$ for each $t \in \{0,1\}$.

Proof: Given Equation (A2), $SRB^t = \alpha^t + \gamma_1 \bar{\mu} + \gamma_2 \bar{\Psi}^t$. Then, the effect of wages on the SRB is given by: $\frac{\partial SRB^t}{\partial \bar{w}} = \gamma_2 \frac{d\bar{\Psi}^t}{d\bar{w}}$. Since $\gamma_2 > 0$, the sign of $\frac{\partial SRB^t}{\partial \bar{w}}$ coincides with that of $\frac{d\bar{\Psi}^t}{d\bar{w}}$. Given Equation (A3), we get $\frac{d\bar{\Psi}^t}{d\bar{w}} = \begin{cases} -a^{-b\bar{w}} b \log a, & if\ t = 0 \\ c - a^{-b\bar{w}} b \log a, & if\ t = 1 \end{cases}$. Notice that $[-a^{-b\bar{w}} b \log a] < 0$ and $[c - a^{-b\bar{w}} b \log a] < 0$ because c>0 but, by definition, it is small enough. Thus, $\frac{\partial SRB^t}{\partial \bar{w}} < 0$ for each $t = \{0,1\}$. □

Result 1 indicates that one should expect the SRB to decrease when wages increase in a society, regardless of whether the SRB is observed before or after the incurrence of registration costs. Note that Result 1 assumes that the marginal registration cost is small enough and, therefore, it implies that the income effect dominates over the opportunity cost effect, leading to the overall negative relationship between wages and the SRB. In the next results, we provide a finer-grained analysis of the relationship between wages and the SRB by comparing societies that differ in average wages (Result 2), nurturing costs (Result 3) and registration costs (Result 4).

Result 2. Consider a society, which has two different seasons, namely harvest and winter, such that $\bar{w}_{harvest} > \bar{w}_{winter}$. Then, $\left[\frac{\partial SRB}{\partial \bar{w}} \middle| winter\right] < \left[\frac{\partial SRB}{\partial \bar{w}} \middle| harvest\right]$.

Proof: The proof is straightforward if we consider a society with a continuum of possible average wages and evaluate the second derivative of the function representing the relationship between wages and the SRB. Given Equation (A2), $SRB^t = \alpha^t + \gamma_1\bar{\mu} + \gamma_2\bar{\Psi}^t$. Then, we get that $\frac{\partial^2 SRB^t}{\partial \bar{w}^2} = \gamma_2 \frac{d^2\bar{\Psi}^t}{d\bar{w}^2}$. Computing the second derivative of wages on costs (Equation (A3), we get $\frac{d^2\bar{\Psi}^t}{d\bar{w}^2} = a^{-b\bar{w}} b^2 \log a^2 > 0$ for each $t = \{0,1\}$. Since $\gamma_2 > 0$, then $\frac{\partial^2 SRB}{\partial \bar{w}^2} > 0$. This result implies that the change in the SRB associated with a given wage increase depends on the initial wage level and, in particular, shows that the change is larger (i.e., less negative or closer to zero) in contexts of higher initial wage levels. We use $\frac{\partial^2 SRB}{\partial \bar{w}^2} > 0$ to compute the first difference between two particular seasons, one with low (winter) and the other with high (harvest) initial wages, such that $\left[\frac{\partial SRB}{\partial \bar{w}} \middle| winter\right] < \left[\frac{\partial SRB}{\partial \bar{w}} \middle| harvest\right]$. □

Result 2 shows that the change in the SRB with changes in wages is more pronounced (more negative) in societies (or seasons) with lower wages than in those with higher ones. It is thus expected that the reduction in the SRB with wages will be greater during winters than during harvest seasons. Figure B1 provides a numerical example of Result 2. Notice that for high enough wages, we expect to have negligible effect of wages on the SRB: $\lim_{\bar{w}\to\infty} \frac{\partial SRB}{\partial \bar{w}} = 0$.

Result 3. Consider two societies, stem and nuclear, that differ only in their nurturing costs, such that $\bar{\Psi}^*_{nuclear} > \bar{\Psi}^*_{stem}$. Then, $\left[\frac{\partial SRB}{\partial \bar{w}} \middle| nuclear\right] < \left[\frac{\partial SRB}{\partial \bar{w}} \middle| stem\right]$.

Proof: Given Equation (A2), $SRB^t = \alpha^t + \gamma_1\bar{\mu} + \gamma_2\bar{\Psi}^t$. Then, $\left[\frac{\partial SRB}{\partial \bar{w}} \middle| nuclear\right] - \left[\frac{\partial SRB}{\partial \bar{w}} \middle| stem\right] = \gamma_2\left(\left[\frac{d\bar{\Psi}^t}{\partial \bar{w}} \middle| nuclear\right] - \left[\frac{d\bar{\Psi}^t}{\partial \bar{w}} \middle| stem\right]\right)$. Since $\gamma_2 > 0$, the sign of $\left[\frac{\partial SRB}{\partial \bar{w}} \middle| nuclear\right] - \left[\frac{\partial SRB}{\partial \bar{w}} \middle| stem\right]$ coincides with that of $\left[\frac{d\bar{\Psi}^t}{\partial \bar{w}} \middle| nuclear\right] - \left[\frac{d\bar{\Psi}^t}{\partial \bar{w}} \middle| stem\right]$. Notice that this difference is the same in $t = 0$ and in $t = 1$ because the opportunity costs are the same in stem and in nuclear provinces. Formally, $\left[\frac{d\bar{\Psi}^t}{\partial \bar{w}} \middle| nuclear\right] - \left[\frac{d\bar{\Psi}^t}{\partial \bar{w}} \middle| stem\right] = \left[\frac{d\bar{\Psi}^*}{\partial \bar{w}} \middle| nuclear\right] - \left[\frac{d\bar{\Psi}^*}{\partial \bar{w}} \middle| stem\right]$. Given the functional forms in Equation (A3), we can compute this difference: $\left[\frac{d\bar{\Psi}^*}{\partial \bar{w}} \middle| nuclear\right] - \left[\frac{d\bar{\Psi}^*}{\partial \bar{w}} \middle| stem\right] = (-a^{-b\bar{w}} b \log a)\,(\sigma - 1)$, where $\sigma = \frac{\bar{\Psi}^*_{nuclear}}{\bar{\Psi}^*_{stem}} > 1$.

Given $[-a^{-b\bar{w}} b \log a] < 0$ and $\sigma > 1$, we get $\left[\frac{\partial SRB}{\partial \bar{w}} \middle| nuclear\right] < \left[\frac{\partial SRB}{\partial \bar{w}} \middle| stem\right]$.□

Result 3 highlights that the change in the SRB with wages will be more pronounced (more negative) in societies with higher costs of nurturing girls (relative to nurturing boys). Figure B2 presents a numerical example that shows marginal costs associated with wages for a society with high (nuclear) and low (stem) nurturing costs.

Result 4. Consider two societies, standard and gendered reporting, that differ only in their registration costs such that $\bar{r}_{standard} < \bar{r}_{Gendered}$. Then, $\left[\frac{\partial SRB^t}{\partial \bar{w}} \middle| standard\right] = \left[\frac{\partial SRB^t}{\partial \bar{w}} \middle| gen\_report\right]$ if $t = 0$ and $\left[\frac{\partial SRB}{\partial \bar{w}} \middle| standard\right] < \left[\frac{\partial SRB}{\partial \bar{w}} \middle| gendered\right]$ if $t = 1$.

Proof: Showing that standard and gendered-reporting societies do not differ in their marginal effect of wages on the SRB in $t = 0$ is straightforward given the assumption that the two societies are identical except for the registration costs. On the other hand, given Equation (A2), $SRB^1 = \alpha^1 + \gamma_1\bar{\mu} + \gamma_2\bar{\Psi}^1$, $\left[\frac{\partial SRB^1}{\partial \bar{w}} \middle| standard\right] - \left[\frac{\partial SRB^1}{\partial \bar{w}} \middle| gen\_report\right] = \gamma_2\left(\left[\frac{d\bar{\Psi}^1}{d\bar{w}} \middle| standard\right] - \left[\frac{d\bar{\Psi}^1}{d\bar{w}} \middle| gen\_report\right]\right)$. Since

$\gamma_2 > 0$, the sign of $\left[\frac{\partial SRB^1}{\partial \bar{w}}\middle| standard\right] - \left[\frac{\partial SRB^1}{\partial \bar{w}}\middle| gen\_report\right]$ coincides with that of $\left[\frac{d\bar{\Psi}^1}{d\bar{w}}\middle| standard\right] - \left[\frac{d\bar{\Psi}^1}{d\bar{w}}\middle| gen\_report\right]$. Furthermore, notice that the only difference is in opportunity costs. Then, $\left[\frac{d\bar{\Psi}^1}{d\bar{w}}\middle| standard\right] - \left[\frac{d\bar{\Psi}^1}{d\bar{w}}\middle| gen\_report\right] = \left[\frac{d\bar{\tau}}{d\bar{w}}\middle| standard\right] - \left[\frac{d\bar{\tau}}{d\bar{w}}\middle| gen\_report\right]$. Given the functional forms in Equation (A3), we can compute this difference: $\left[\frac{d\bar{\tau}}{d\bar{w}}\middle| standard\right] - \left[\frac{d\bar{\tau}}{d\bar{w}}\middle| gen\_report\right] = c(1-\sigma)$, where $\sigma = \frac{\bar{r}_{gen\_report}}{\bar{r}_{standard}} > 1$.

Given $c > 0$ and $\sigma > 1$, we get: $\left[\frac{\partial SRB}{\partial \bar{w}}\middle| standard\right] < \left[\frac{\partial SRB}{\partial \bar{w}}\middle| gen\_report\right]$ if $t = 1$. □

Result 4 shows how increased wages will lead to greater reductions in the SRB (observed after the incurrence of registration costs) in standard societies than in gendered-reporting societies. The reason for this is that the increase in registration costs with wages strongly counterbalances the decrease in nurturing costs with wages, and this counterbalance is stronger in gendered-reporting societies. Interestingly, Result 4 shows how, by comparing the first difference in the SRB in societies with high and low registration costs, we could establish a proxy of the weight of registration costs among low-waged families. Notice that a particular case of a standard society is that with $\bar{r}_{standard} \sim 0$. For this type of society, there is no observable difference between the SRB before and after the incurrence of registration costs (other than those that result from biological differences in mortality, which would be captured by parameter α^t). Then, societies with nearly zero gender bias in registration costs could be used as proxy for the situation of the gendered-reporting societies before the incurrence of registration costs, i.e., as if they were in $t = 0$. That is, the first difference between two societies with differences in the gender bias in the cost of registration helps to measure differences due to the incurrence of registration costs: $[SRB^1|gen_r eport] - E[SRB^1|standard] =$
$= [SRB^1|gen\_report] - E[SRB^0|gen\_report] = \bar{\tau}$. Thus, estimating the first difference between societies with differences in gender bias in registration costs is indicative of the unobservable capacity of low-waged families with live but unregistered daughters to bias the observed SRB.

Finally, it is worth remarking that failure to meet the assumption in our framework that the marginal cost of registration is sufficiently small would mean that it is possible for the effect of wages on the SRB in $t = 1$ to be positive (see figure B3 for a numerical example). Thus, it is interesting to acknowledge that our theoretical framework allows us to study the direction of the effect (Result 1), the speed of change in the relationship between wages and the SRB (Result 2), and helps to disentangle fatal neglect and under-registration (Results 3 and 4).

References

Beltrán Tapia, F.J., and Marco-Gracia, F.J. (2022). Death, sex and fertility: Female infanticide in rural Spain, 1750-1950. European Review of Economic History 26(2):234-254.

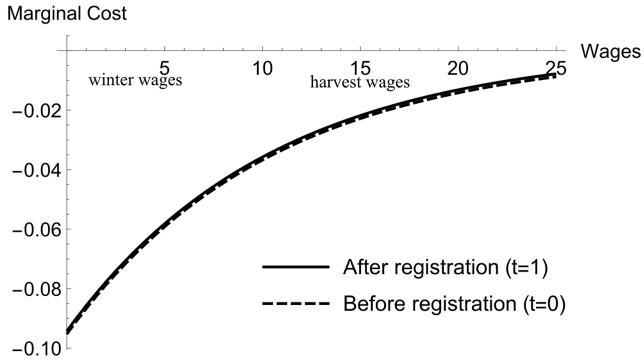
Das Gupta, M., and Shuzhuo, L. (1999). Gender bias in China, South Korea and India 1920-1990: Effects of war, famine and fertility decline. Development and Change 30 (1999): 619-652.

Lin, M. J., Liu, J. T., and Qian, N. (2014). More missing women, fewer dying girls: The impact of sex-selective abortion on sex at birth and relative female mortality in Taiwan. *Journal of the European Economic Association* 12(4): 899-926.

Peacock, J. L., Marston, L., Marlow, N., Calvert, S. A., and Greenough, A. 2012. Neonatal and infant outcome in boys and girls born prematurely. *Pediatric Research* 71(3): 305-310.

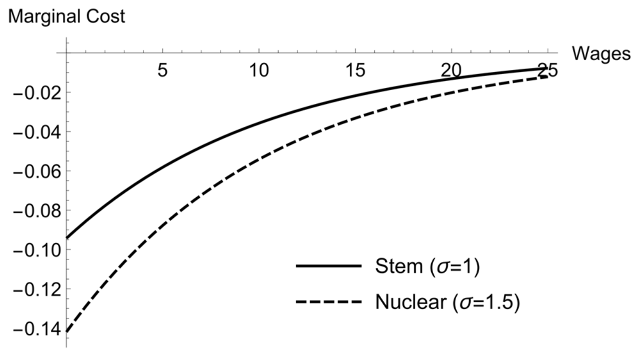
FIGURES FROM THE CONCEPTUAL FRAMEWORK

Figure B1. Variation in costs with harvest wages vs winter wages.



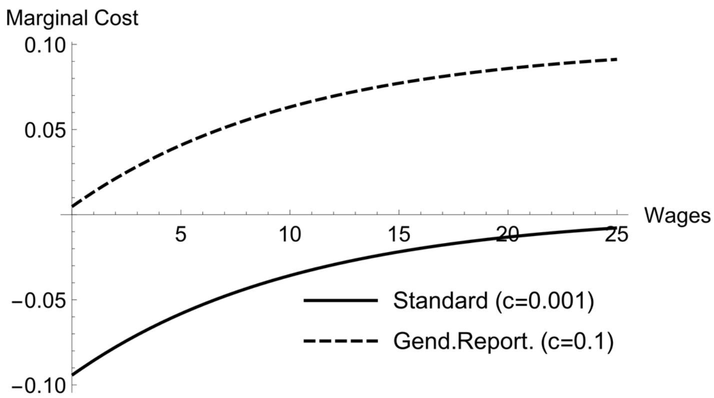
Example is for cost function: $\bar{\Psi}^t(\bar{w}) = \begin{cases} 1.1^{-\bar{w}}, & t = 0, \\ 1.1^{-\bar{w}} + 0.001\bar{w}, & t = 1. \end{cases}$

Figure B2. Variation in costs with wages in stem vs nuclear provinces.



Example is for cost function: $\Psi^t(\bar{w}) = \begin{cases} \sigma 1.1^{-\bar{w}}, & t = 0, \\ \sigma 1.1^{-\bar{w}} + 0.001\bar{w}, & t = 1. \end{cases}$

Figure B3. Variation in costs with wages in standard vs gendered-reporting societies.



Example is for cost function: $\Psi(\bar{W}) = 1.1^{-\bar{W}} + c\bar{W}$.