International Review of Entrepreneurship 12(1): 1-22.

Cultures of Female Entrepreneurship[1]

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Abstract. The present research shows entrepreneurial culture contributes to the widely noted difference in entrepreneurial propensities between men and women. The consequences of the assumed differential importance of household and family generate testable hypotheses about the gender effects of entrepreneurial culture. The principal hypothesis is that there is a greater chance of females in 'unentrepreneurial' cultures being relatively entrepreneurial compared to males. Also women from different entrepreneurial cultures show greater similarity of behaviour (lower variance) than men. But proportionate gender gaps within entrepreneurial cultures are less than those between males of different cultures. These hypotheses are tested on US immigrant data from the 2000 census and are not rejected.

Keywords: entrepreneurship, culture, gender, migrants.

JEL Classification: D01; J15; J23; J61; J16

1. Introduction

How does entrepreneurial culture contribute to the widely noted difference in entrepreneurial propensities between men and women (Acs, et al, 2005; Brush, 2006; Verheul et al, 2006)? A prior question concerns the meaning of culture, influentially described as 'the collective programming of the mind which distinguishes the members of one group or category' (Hofstede, 2003 p5). A more expansive definition of culture is "shared motives, values, beliefs, identities, and interpretations or meanings of significant events that result from common experiences of members of collectives and are transmitted across age generations" (House et al., 2001 p494). Entrepreneurial culture then is the shared values and preferences of the group that affect the chances of an individual becoming an entrepreneur.

Shared values and beliefs influence individual agent's intentions to take entrepreneurial action, but such action depends upon opportunity as well as intention (van Praag and van Orphem, 1995). Entrepreneurial opportunity varies

1. Thanks to Francis J Greene, Yi Wang, to participants in the Madrid conference on entrepreneurship hosted by the Fundacion Mapfre, in a Cardiff University workshop and in the ISBE annual conference, Sheffield, and to the editor and two referees of this journal.

with institutional and macroeconomic conditions. Divergences between intention (influenced by culture) and outcome (of entrepreneurial action) could be attributable to such opportunities. A contribution of the present paper is to distinguish the effects on entrepreneurship of opportunity constraints from those of culture. The approach requires that migrants bear with them the culture from which they originated (a proposition supported by Guiso et al, 2006 fig. 3). Consequently relative cultural impacts on entrepreneurial action can be identified by considering the choices and actions of these migrant groups in a common economic environment – the United States.

Cultural values will influence gender roles and stereotypes, thereby determining occupations – including entrepreneurship – considered appropriate for men or women (Mueller, 2004; Shinnar et al, 2012). In addition to discrimination (which is an institutional influence), women's choice of entrepreneurship is linked with gender ascription (Fischer et al, 1993; Marlow and Patton, 2005; Gupta et al, 2009). Social feminist theory suggests that the values of women and men differ because of divergent socializations (Eddlestone and Powell, 2008; Schwartz and Rubel-Lifschitz, 2009). Socialization might explain why 'fear of failure' (stemming from dissimilar values) and maternal influence (different cultural transmission), have a differential impact on female and male entrepreneurship (Langowitz and Minniti, 2007; Greene et al, 2011). But not all values affecting entrepreneurship differ between men and women apparently – those for family life and job security for instance (Burke et al, 2002 Table III; Verheul et al, 2006).

The present paper models cultural values as components of shared preference functions. The reasons for these preferences are not addressed; they are taken as given. The paper explores how values influence the probability of choosing entrepreneurship through the allocation of time and other constraints. It does so by deducing and testing the consequences of certain plausible assumptions. The properties of the model are demonstrated to enhance plausibility. A critical element of the model for present purposes is the assumption that for cultural reasons females place a higher value on the family and the household than males. It follows that for cultural reasons, not simply because of discrimination, genuine female entrepreneurship will be lower than male. (Here it is especially important to distinguish between (non-entrepreneurial) self-employment and entrepreneurship[2]). Other cultural consequences are demonstrated to follow from this result.

Cultural groups are not necessarily only, or even mainly, differentiated by gender. Shared experiences giving rise to common values, and the transmission

2. Though in practice the distinction is usually hard to make. Entrepreneurship is generally reckoned to involve some element of innovation. An attraction of (non-entrepreneurial) self-employment may be the opportunity to choose the timing of work (see Parker (2009) on female entrepreneurship). By contrast entrepreneurship typically involves a much greater time commitment than wage work, dominating greater work timing autonomy.

of these values, are likely to stem from being brought up in the same location. This ethnicity dimension of culture and of entrepreneurial culture is also considered.

Related previous research includes that of Lofstrom (2003) who used US census data to identify origin effects on immigrant self-employment as well. But Lofstrom restricts the analysis to males and aggregates over what may be different cultural groups, while, unlike the present study, comparing them to the indigenous population. Close to the modelling approach here are the explicit utility functions of Carree and Verheul (2009) and Verheul et al (2009). These papers separate the effect of productivity from preferences on the time allocation of the self-employed by gender. However, these studies are restricted to individuals from a single country, the Netherlands, and they are not concerned with the choice between entrepreneurship and non-entrepreneurship. In contrast to international cross-section studies estimating cultural effects on entrepreneurship (e.g. Verheul et al, 2006), the approach here does not impose the restriction that all national entrepreneurial cultures are similar except in the values of the indices by which they are measured. Moreover using individual level data allows much greater precision than aggregated national data. Previous research has demonstrated that male and female entrepreneurship differs but has not convincing divided national cultural from other influences[3].

The following section 1sets out the model and the derived hypotheses. Section 2 describes the US data and how it is to be used in the study. The hypotheses about female entrepreneurial culture, and the relation to family and household, are tested in section 3. A concluding discussion in section 4 provides some qualifications and suggestions for further research.

2. The Model

Cultural factors influence the average behaviour of the cultural group. The preferences of a representative agent may be interpreted as the cultural values of the set for which the agent is representative; they are values shared by members of the group.

In the present model each culture potentially has a different culture function, with different weights on consumption, leisure, entrepreneurship and family and household. A group of persons for cultural reasons are assumed to derive well-being from consumption of market goods and services (C), from time spent in leisure (L) and in entrepreneurship (E_1) and from household and family goods and services *(* H), in a CES function[4]. A materialistic culture places a greater weight on C for instance. The relevance of a culture to entrepreneurship is

3. For example Langowitz and Minnitti's (2007) country fixed effects will conflate country-specific institution effects on entrepreneurship with country-specific cultural effects not captured by the culture variables.

identified by the relative weight attached to entrepreneurship in the preference or culture function.

Also assumed is a collective (Cobb-Douglas) production function for market consumption goods and services, with both entrepreneurship time (E_1) and employment time (E_2) as inputs. Household production supplies family and household goods and service (*H*) using family time (*F*). Where U is the 'culture function', the well-being maximisation problem can be formalised as:

$$\max_{C,L,E_1,E_2,H,F} U\left(C,L,E_1,H\right), \text{ subject to:}$$

$$H = BF,\ C = AE_1^{\varepsilon}E_2^{1-\varepsilon} \text{ and } L + E_1 + E_2 + F = 1$$

$\alpha, \beta, \gamma, \delta$ are weights assigned to consumption, leisure, entrepreneurial effort and household services in the 'culture' function. A denotes the total productivity, while ε is the income share of (output elasticity of time allocated to) entrepreneurship, in the Cobb-Douglas production function. This productivity measure is also likely to be culturally determined. Some cultures work well in organisations relative to individually – a high value of $1 - \varepsilon$; others do not. But the productivity line is not pursued here. In the home production function B measures productivity; a higher value means a greater return to family time[5].

To solve the system we assume an elasticity of substitution for the 'culture' function of 0.5, $\varepsilon = 0.3$, $\alpha = \beta = \gamma = 1$ and initially also $\delta = 1$, as well as A = B = 1. When work productivity, A, increases, more of all desirable things can be obtained while undesirable inputs to work can be reduced; employment propensity falls while entrepreneurship propensity rises, along with market consumption, leisure, household goods and services and family time. An increase in household productivity (B rises for example because of the use of domestic appliances such as washing machines and vacuum cleaners) raises entrepreneurship and employment propensities along with market consumption and leisure as well as household services, while reducing family time necessary to generate the now more abundant household services (see Appendix A).

A culture with a higher leisure preference (bigger β) must have a lower relative preference for entrepreneurship, employment and family. As expected, the simulation for this set of preferences (with both elasticities of substitution 0.1 and 0.5) shows lower everything except leisure.

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4. With the simpler Cobb-Douglas preference function and the same constraints some of the model properties were not plausible.
5. In the interests of keeping the model simple (saving an extra parameter), for present purposes the productivity of family time is much greater than entrepreneurship or market employment. This has the consequence that, as the elasticity of substitution increases and the arguments of the culture function become closer substitutes, family time and household production displace market activity, entrepreneurial and employment.

If (relative to others) a culture does not especially favour time spent in entrepreneurship but regards it as no different from time spent in employment ($\gamma \to 0$), entrepreneurship is lower, as is consumption, while employment, household services, family time and leisure are higher. On the other hand, entrepreneurship remains high even when the productivity of entrepreneurship is very low, as long as it is favoured by the culture. Only when an 'unentrepreneurial' culture is combined with low entrepreneurial productivity does entrepreneurship sink to very low levels – a propensity of about 2 percent in the Appendix simulations. Changing the production weights so that entrepreneurship is more important than employment (weight 0.6) there are increases from the base case in consumption, leisure, entrepreneurship, household production and family time commitment and a big fall in employment. Productive efficiency matters more than preferences between work modes.

We hypothesize that because of socialisation there are different 'culture functions' for men and women. The distinctive difference between them across country ethnic cultures is assumed to be that the female's (f) cultural weight on household and family services tends to be greater than the male's (m) ($\delta_f > \delta_m$)[6]. Since household service production is unpaid work, the hypothesis is supported by the observations that UK women did more than four times as much unpaid work as men in 1961, and a little less than twice as much as men in 2001 (Gershuny, 2011). Dutch women aged 25-64 were estimated to spend almost 40 hours a week on average even in 1990 on unpaid work compared to 17.5 for men (Bruyn-Hundt, 1996 Table 4.1). Consequently on average Dutch women invested less time in the business than men (Verheul et al, 2009) and there are fewer 'extremes' among women in allocating time to paid work compared to men (Burke, 1999). In the model (Appendix A) the illustrative weights specified on H are 2 for females and 1 for males. Inevitably more time for family and household means less allocated to entrepreneurship, as well as to everything else, so at the individual household level, the chances of choosing entrepreneurship are reduced (as the model calibrations in the Appendix show).

[H1]for cultural reasons the female entrepreneurial propensity is normally lower than the male[7].

How do gender entrepreneurial preferences vary with the entrepreneurial orientation of the culture? There is a linear relation between female and male cultural entrepreneurial preferences implied by the model[8]. As the elasticity of substitution falls, the divergence between female and male entrepreneurial propensities fall – the coefficient of the linear relation becomes closer to unity.

6. The assumption of different gender values does not preclude the possibility in practice of gender discrimination affecting female entrepreneurial propensities as well as culture.
7. This is not to deny that other reasons might counteract or reinforce the effects of culture.

Where $b<1$ and a are parameters the cultural propensities of entrepreneurship for male and female are respectively:

$$E^*_{1f} = b\,E^*_{1m} - a$$

In mean deviation form

$$E^*_{1f} - {}^*_{1f} = b\,(E^*_{1m} - {}^*_{1m})$$

When optimum male entrepreneurship propensity is low relative to the (male) mean, female entrepreneurship will not be so low (relative to the female mean, because b is less than unity) and conversely, when male entrepreneurship is high.

In averagely entrepreneurial cultures both sides of this equation are zero. In 'unentrepreneurial' cultures both sides are negative. When E^*_{1m} is low relative to the mean, E^*_{1f} will not be so low and conversely when E^*_{1m} is high. It follows that;

[H2] Females in 'unentrepreneurial' cultures are not as 'unentrepreneurial' as are males.

An implication of the above relation is that the variance of female entrepreneurial propensities is less than those of the male.

$$Var\left[E^*_{1f}\right] = b^2 Var\left[E^*_{1m}\right] < Var\left[E^*_{1m}\right], \text{ since } b<1.$$

[H3]: Females are more similar in entrepreneurial propensity than are males for reasons of entrepreneurial culture.

For family firms there is evidence of large cross-cultural differences between the owners of family businesses but far smaller differences between male and female family business owners (Lerner and Malach-Pines, 2011). Baughn et al (2006) indicate that countries with a low proportion of women entrepreneurs are likely also to have overall low levels of entrepreneurial activity (TEA). Further, there is little variability in the levels of entrepreneurship among these economies. These gender gaps could be due to institutions but a logical consequence of H2,

8. When the elasticity of substitution is unity it can be shown that: $\begin{cases} E^*_{1m} = \alpha_m \varepsilon + \gamma_m \\ E^*_{1f} = \alpha_f \varepsilon + \gamma_f \end{cases} \Rightarrow E^*_{1f} = \frac{\alpha_f}{\alpha_m} E^*_{1m} + \gamma_f - \frac{\alpha_f}{\alpha_m}\gamma_m$

where α s are the elasticities of market consumption in the 'culture function'.

measuring entrepreneurial gender differences by their ratio, yields a similar hypothesis.

Given $E^f = -a + bE^m$, where both a and b are less than 1:

$$E^m - E^f = (1-b)E^m + a$$

The variance of the difference is then:

$$Var\left[E^m - E^f\right] = (1-b)^2 Var\left[E^m\right] < Var\left[E^m\right]$$

Therefore;

[H4] The entrepreneurial differences between males and females of the same culture are less than the differences between males of the different cultures.

3. Method and Materials

Males and females brought up in common environment (in this case, origin country) share a culture, but also differ in ways that give rise to variations in entrepreneurial behaviour. The approach here is to distinguish between cultural impacts on the one hand and non-family institutional and macroeconomic effects on the other, on female entrepreneurship by comparing entrepreneurial propensities among migrants from different origins in the common US environment – as measured by the US Census for the year 2000 (Foreman-Peck and Zhou, 2013)[9]. In this way the effects of gender discrimination (for instance) in national origins may be eliminated – to the extent that the institutions of discrimination have been left behind in the origin countries.

The focus is not on the absolute effect of culture (no comparison is drawn with those born in the United States), but on the difference between immigrant cultures of origin. Migrants may be more dynamic, or more restless, than the population as a whole, but the comparison groups are other migrants who are likely to share these characteristics. English immigrants in the US may not be quite the same the types as the population of England as a whole, but the difference between English immigrants and German immigrants (perhaps equally more dynamic or restless than their stay-at-home compatriots) should be broadly similar to that between the English and Germans.

9. Five per cent samples from IPUMS (http://usa.ipums.org/usa/). All the variables in the analysis are from this Census source. The sample is restricted to immigrants working outside agriculture.

The immigrant groups studied are restricted to origin countries with at least a century of history of migration to the US so that in the year of concern, 2000, there are unlikely to be any 'new immigrant' effects (Hatton and Leigh, 2011) (we also conduct a test that confirms this proposition, see Appendix B). Purely cultural propensities – where culture is normally assumed to be that of the country of origin – towards entrepreneurship are then identified. However, this proposition only applies to relative female entrepreneurial culture effects, unless it is clear that there is no relevant gender discrimination in the United States in the year 2000. In the presence of such discrimination the relationship between male and female entrepreneurial effects will reflect not only culture but US institutional and other constraints as well.

A more exacting test for different gender 'culture functions' is whether the effect on entrepreneurship of (generally family time-intensive) marriage differs between genders in the way assumed by the model. If it does then at least some of the gender differences in entrepreneurial propensity may be attributed to culture.

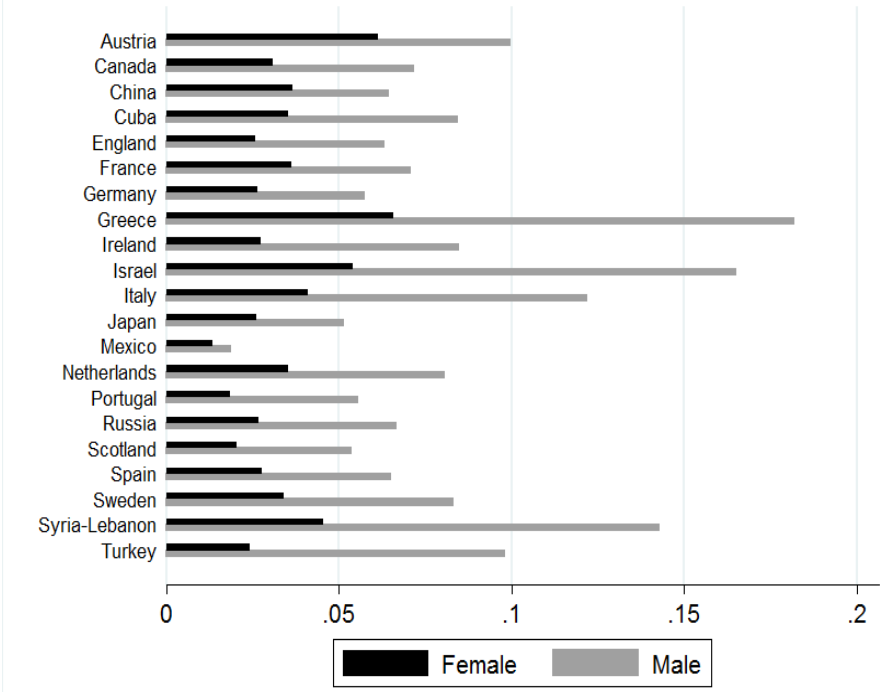
By comparison with the widely used questionnaire approach, the method adopted here to measuring the effect of culture is indirect. The 'culture function' itself is not estimated or tested; only the behavioural consequences are. The method has the advantage of imposing less structure on agents' intentions and culture (or social norms) than does the questionnaire. The questionnaire approach usually aggregates attitudes and values that are both self-perceived and the perceptions of others, which is controversial (Smith, 2006). In recent studies cultural dimensions have multiplied and questions been added to reflect new social interests (House et al, 2001; Uhlaner and Thurik, 2007; Konig et al, 2007). But a recent assessment concluded that many hypotheses concerning the influence of these 'direct' cultural indices on entrepreneurship are often contradictory (Hofstede et al, 2004 p173). The alternative indirect approach, outlined above, is to measure culture by what is left to explain of entrepreneurship when the contribution of institutions, age, and other factors are controlled (for example Grilo and Thurik, 2006). In the indirect approach of the present study there is nonetheless a sense in which culture is a variable affecting entrepreneurship, for each country of origin identifier has an estimated marginal (cultural) probability of entrepreneurship associated with it[10]. Whether specific origins, or ethnicity, matter for entrepreneurship is an empirical question with the

10. Is it likely that omitted variables bias the estimated cultural effects? Might non-cultural influences on entrepreneurship be transmitted by immigrant country of origin? This raises the question as to what variables affecting entrepreneurship are influenced by culture themselves and should be excluded. When an individual's education is not controlled (it is in fact) and education differs by country of origin, cultural effect estimates may differ. In any case the Census data set limits the number of controls that can be included or excluded. This is the down side of the very large samples the US Census makes available. The upside is the 217050 cases available for females and 282022 cases for males in Table 2.

specification used here; is the particular origin a statistically significant influence upon entrepreneurship chances or not?

Entrepreneurs are defined as self-employed in incorporated businesses[11]; immigrants are unlikely to inherit firms so almost certainly this category will have started their enterprise. The variable corresponding to E_1* in the model is the entrepreneurship ratio, or the chances of a member of a migrant group being an entrepreneur i.e. having started a business. Figure 1 shows that male and female entrepreneurship chances vary markedly across immigrant groups. Clearly, for no group does female entrepreneurship anywhere near match that of males. But this could be because of different agent characteristics.

Figure 1: Entrepreneurial Chances in the US of Migrants by Origin 2000



Individuals with higher education levels might have higher entrepreneurial propensities. If female education levels were lower than males, this could contribute to differences in entrepreneurship, rather than culture. Moreover, people with different work experience tend to have different chances of becoming entrepreneurs. Without addressing the impact of these factors, the simple

11. The only alternative in the Census categories is 'other self-employed'. While recognising the empirical classification employed in this study is a less than perfect match for genuine entrepreneurship – and this limitation should be borne in mind – it compares favourably with many other published empirical studies of entrepreneurship.

entrepreneurship ratio of figure 1 might be misleading as an indicator of the entrepreneurial culture of immigrants' origins. Taking them into account entails statistically controlling for these variables, as well as for country of origin fixed effects. The origin country effects will then isolate the pure marginal impact of culture on entrepreneurship, purged of other influences (this is the alternative and preferred estimate of E_1^*).

Individual agent effects on entrepreneurial propensities might include wealth, working through risk attitude perhaps. The need at first to acquire savings and work experience increases entrepreneurship with age, and perhaps eventually diminishes it (Parker, 2004). Information about entrepreneurial opportunities is likely to rise with duration of immigrants' residence in the United States, and with ability to speak English. Both would then boost the likelihood of becoming an entrepreneur. By increasing awareness of opportunities, formal education could increase entrepreneurial chances. Marital status effects provide a test of a key assumption of the theoretical model; as long as marriage implies greater commitment of family/ household time, the model predicts different male and female coefficients. If the marital division of labour raises (household) productivity (raises B), then both male and female chances of entrepreneurship will increase with marriage but the female chances by less than male (as long as the female has a greater weight on H).

Sectors in which employment or self-employment takes place measure the type of work experience that may influence entrepreneurial choice. Also greater expected rewards will increase the likelihood of an individual becoming an entrepreneur. This last provides a link of entrepreneurial supply with the demand or opportunities for entrepreneurship.

The choice of sector or industry for entrepreneurship depends on the return-risk profile and entry barriers. Finance and business services offer high returns, while wholesaling and retailing have much lower risk and entry barriers compared to other industries. These activities then have higher chances of attracting entrepreneurs starting up new businesses. Since the focus of the present study is only one country (the USA), the possibility that culture can influence entrepreneurial opportunity can be ignored[12].

The structural relations of entrepreneurial supply and opportunities have expected returns, as well as entrepreneurial chances, in common. Solving them to eliminate expected returns yields a reduced form equation of the equilibrium probability that an immigrant of given gender might become an entrepreneur (Y):

Pr(Y=1) = f(culture [origin], marital status, education, wealth, native language speaker, naturalisation, age, residence duration, sector) …..(1)

12. Although US culture as well as institutions may be a reason for the higher level of US entrepreneurship relative to all European countries, as noted by Grilo and Irigoyen (2006) among others.

Equation (1) is estimated separately for males and females, using logit binary occupational choice, as is conventional in this field (for example Blanchflower et al, 2001; Lofstrom, 2002; Grilo and Irigoyen, 2006).

4. Results

In equation (1) estimated on the US census data, some of the controls (Table 1) showed substantial differences between males and females. Married women were more likely to be entrepreneurs in 2000 than unmarried but the impact on their chances of entrepreneurship was about half that of marriage for men. This is consistent with the model assumption that female culture places a greater weight on family time, as noted above[13].

Table 1: Marginal Effects of Controls for Entrepreneurship in 2000;from Logits

2000	Female	Male
Marital Status (married = 1)	0.00383***	0.00845***
6~10 years in US	0.00187	0.00755***
11~15 years in US	0.00457***	0.0112***
16~20 years in US	0.00432***	0.0129***
21+ years in US	0.00123	0.00917***
Naturalization	0.00132*	0.00470***
Education (Grade 1~12)	-0.00272*	0.00193
Education (1 to 3 years of college)	-0.00092	0.00673***
Education (4+ years of college)	0.00233	0.0101***
English Speaking	0.00398***	0.00652***
Construction	0.0282	0.0544***
Manufacturing, durables	-0.0114***	-0.00705
Manufacturing, nondurables	-0.00997*	-0.00239
Transportation, Communication, and Other Utilities	-0.00321	0.0134
Wholesale and Retail Trade	0.0057	0.0364***
Finance, Insurance, Real Estate, Business and Repair Services	0.00321	0.0377***
Personal, Entertainment and Recreation Services	-0.0105	0.0128*
Age	0.00193***	0.00217***
Age Squared	-0.0000162***	-0.0000170***
Own Property	0.00705***	0.0140***

Note: * $p<0.05$, ** $p<0.01$, *** $p<0.001$.For binary dummies, discrete changes from 0 to 1.

13. It might be contended that the marriage coefficient differential reflects discrimination rather than culture. But it is not clear that discrimination against potential and actual female entrepreneurs should focus on their marital status any more or less than, say their education. Yet marriage does increase female entrepreneurship in these groups and education does not.

Women's maximum probability of entrepreneurship age was less than 60, while men's was almost 64. Education did not encourage immigrant female entrepreneurship in 2000, in contrast to males. The positive effects of the proxy for wealth, 'own property', on entrepreneurship probability for females was significantly different from zero and half that of males, which was also approximately true for the ability to speak English. Naturalisation and years of residence in the US did promote entrepreneurship by women but much less strongly than they did for men; for instance 6-10 years residency (relative to the base category of 5 years or less) was a significant contributor to male entrepreneurship but not to female.

Table 2: Entrepreneurial Culture Marginal Effects 2000

Origin Country	Female	Male
Mexico	-0.006***	-0.0236***
Cuba	0.00185	0.00299*
England	-0.0035**	-0.0034**
France	0.00248	0.0023
Germany	-0.0022*	-0.004***
Ireland	-0.003	0.00133
Netherlands	0.00055	-0.0005
Italy	0.00227	0.00772***
Greece	0.01229***	0.02557***
Turkey	-0.0018	0.01843***
Russia	-0.001	0.00125
China	0.00199	-0.0031**
Japan	-0.0018	-0.0028
Syria and Lebanon	0.00655*	0.02399***
Israel (Jewish)	0.01318***	0.03407***
Sweden	0.00231	0.00801
Austria	0.01058	0.00363
Scotland	-0.007***	-0.0085***
Portugal	-0.0054***	-0.0076***
Spain	0.00098	-0.0004
Correlation	0.79095	

Note: *p<0.05, **p<0.01, ***p<0.001. For binary dummies, discrete changes from 0 to 1. Derived from Logit model equation 1, the estimated control prameters of which are in Table 1.

Table 2 uses the same estimated logit equation to identify conditional entrepreneurial culture from the country of origin coefficients. From the migrant sample used for the model, female entrepreneurship chances (0.024) are considerably lower than male (0.044). From the 'culture' coefficients it is apparent that culture plays an important role. At one extreme Mexican males are associated with 2.34 percent lower chances of entrepreneurship, while Mexican female chances are only 0.6 percent lower than the female average. Adding up all

the statistically significant female culture coefficients, the net effect on female entrepreneurship probabilities is 0.1 percent, whereas the same exercise for the male coefficients yields a percentage four times as large. With this definition of entrepreneurial culture, implied by the use of the origin coefficients, the evidence is consistent with H1, the hypothesis that for cultural reasons female entrepreneurship will be lower than male.

The validity of H2, whereby females from more entrepreneurial cultures were relatively less entrepreneurial than males but those from less than averagely entrepreneurial source countries were rather more entrepreneurial, emerges strongly in Table 2. For instance females from Greece in 2000 were significantly more entrepreneurial than the female average. Their coefficient at 0.01229 was the second largest in sample, but significantly less so than their male counterparts (about half), who like the females had the second largest cultural effect in the sample. By contrast German-originating females showed a higher cultural marginal propensity to entrepreneurship (-.0022) than German-originating males (-.004) who were also less entrepreneurial than their sample average (the fourth lowest)[14].

On the one hand females confirmed the importance of inherited entrepreneurial culture from many countries in the year 2000 when the opportunity arose. But on the other, their culturally-influenced behaviour differed from males with similar origins -in the cases of those groups significantly more, or less, entrepreneurial than the average. French, Dutch and English migrants, who were about averagely entrepreneurial in the sample, exhibited no significant differences between male and female cultural propensities.

14. The index of conditional entrepreneurial culture is an interval measure but does not have an absolute zero. So with a different sample of migrants the zero point of average entrepreneurial culture could be in a different place. While the interval between the coefficients is meaningful it is possible to rescale the index, maintaining the relative intervals, so that the lowest entrepreneurship coefficient is set to zero. If this is done the result is that entrepreneurial culture effect for females is always less than for males.

Figure 2: Relation of female and male entrepreneurial cultures 2000 (Logit)

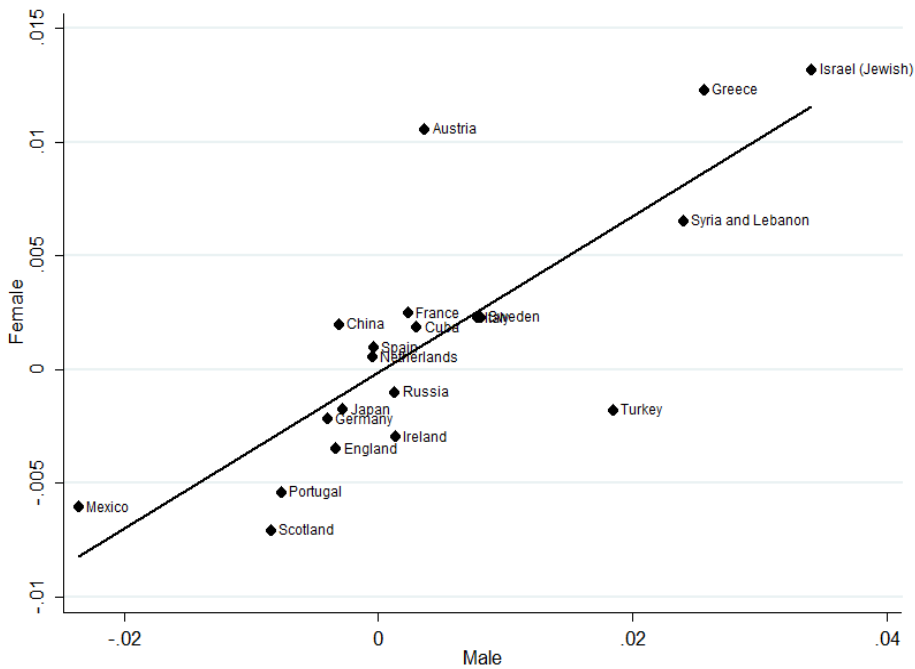


Figure 2 provides a systematic comparison by plotting the 'culture' coefficients for females against males. The regression coefficient of the relationship is highly significantly different from zero and from unity. The R-squared is 0.6256 and the F statistic is 30. The OLS coefficient is 0.34 rising to 0.37 for Huber regression, robust to outliers. It is the magnitude of this coefficient – together with the intercept not significantly different from zero – that tests the female entrepreneurial culture hypothesis H2, from which H3 and H4 are derived. The regression demonstrates that for these countries as a whole, cultures giving rising to highly entrepreneurial males also give rise to highly entrepreneurial females but to a much more limited extent (H2). For entrepreneurial cultures that are less strong than average, female entrepreneurial propensities diminish relative to the average by less than those of males.

H3, that females are more similar in entrepreneurial propensity than are males for reasons of entrepreneurial culture is shown by the standard deviations of the two columns of Table 2; 0.0057 for females and 0.0132 for males.

H4: females in the present sample were quite differentiated by entrepreneurial culture (8 out of 20 culture coefficients significantly different from zero) and quite similar in their entrepreneurial propensities to males from the same origins (correlation 0.79). The standard deviation of the difference between male and

female culture coefficients in Table 2 at 0.0094 is smaller than the standard deviation of the male coefficients of 0.0132. Entrepreneurial differences between males and females of the same culture are less than the differences between males of the different cultures.

5. Concluding Discussion

The measure of cultural entrepreneurial propensities (E_1^*), with which we have tested the hypotheses, might be questioned. It attempts to control for influences on individual entrepreneurship such as wealth, education and such like, to isolate the origin entrepreneurial 'residual'. But if the acquisition of wealth and education are also entrepreneurial cultural features then the contribution of culture to female entrepreneurship will be under-estimated. An alternative would be to test the hypotheses simply with the immigrant entrepreneurship ratio index, the dependent variable in the estimated model. This test attributes all (relative) entrepreneurial chances to entrepreneurial culture, for variation in the institutional and macroeconomic environment have been eliminated by selection of the common US environment. It ignores the possible effects on entrepreneurship independent of culture of some migrants being wealthy and educated and others less so. In so doing it is likely to over-state the contribution of female entrepreneurial culture. The downward biased estimates have been the focus of the discussion here.

The natural experiment provided by long established migration from many origins to the United States has been exploited to distinguish the effect of entrepreneurial culture from (non-family) institutions, macroeconomic conditions and the domestic environment generally. It has demonstrated that there are wide variations in female entrepreneurship, much of which can be ascribed to culture. Some of these variations follow the widely noted pattern of female entrepreneurship as a whole – the lower propensity than males to become an entrepreneur for instance. For this pattern we have suggested an explanation, a greater female weight on family and household time, confirmed by time use surveys, and we have derived and tested some predictions. In particular, the differential gender effects of marriage on entrepreneurship chances, supports the postulated weights.

In the US sample for cultural reasons there is a systematic relationship between male and female entrepreneurial propensities. The relationship is that with highly entrepreneurial cultures both males and females are highly entrepreneurial, though women less so, while in cultures that do not favour entrepreneurship, females' propensities are much closer to males. Two propositions follow from this relationship. The first is that entrepreneurial propensities between women of different cultures are more similar than those for men. The second is that the difference between male and female entrepreneurial

propensities from the same culture is less than the difference between the entrepreneurial propensities of males from other cultures.

The modelling and the results are for the year 2000 for immigrant groups in the US. It can be imagined that in other places and times cultures were, or will be, different. For instance, cultural preferences may be identical between males and females and so entrepreneurial behaviour differences disappear or at least are not attributable to culture.

Further research with a larger sample of cultures could increase confidence in the hypotheses advanced here. But for the tests to be convincing the additional cultures would need to have a tradition of sending large numbers to the common environment for several generations, as have those used in the present study. This is essential to ensure that the chances of new immigration bias either in favour or against entrepreneurship are eliminated.

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Appendix A: Model Simulations with MATLAB (female case above, male underneath)

$$\max_{C,L,E_1,E_2,H,F} U\left(C,L,E_1,H\right), \text{ subject to:}$$

$$H = BF\,, C = AE_1^{\varepsilon}E_2^{1-\varepsilon} \text{ and } L + E_1 + E_2 + F = 1$$

Where $\alpha, \beta, \gamma, \delta$ are value weights assigned respectively to consumption (C), leisure (L), entrepreneurial effort (E1) and household (H) in the 'culture' function, U. A denotes the total productivity, while ε is the income share of (output elasticity of time allocated to) entrepreneurship, in the market Cobb-Douglas production function. In the home (H) production function B measures the productivity; a higher value means a greater return to family time (F).s is the elasticity of substitution in the CES culture function (U).In the table below the central panel contains the parameter values of the simulation and the right hand panel contains the outcome variable values. The base case shows females in red with twice the δ weight of the male simulation (in black in the row beneath). The entrepreneurial chances are then higher for males (0.2985) than for females (0.2703). To assess the impact of a higher entrepreneurial culture the base case is changed by doubling the γ coefficients for males and females in the next two rows. The value of E_1 rises.

	α	, β	γ	δ	s	A	B	ε	C	L	E_1	H	E_2	F
Base case	1	1	1	2	0.5	1	1	0.3	0.2033	0.2286	0.2703	0.3232	0.1799	0.3222
	1	1	1	1	0.5	1	1	0.3	0.2245	0.2524	0.2985	0.2524	0.1987	0.2514
Higher entrepreneurial culture	1	1	2	2	0.5	1	1	0.3	0.1977	0.2112	0.3344	0.2986	0.1579	0.2976
	1	1	2	1	0.5	1	1	0.3	0.2166	0.2314	0.3663	0.2314	0.1730	0.2304
Very low entrep. culture -almost zero utility weight on E1	1	1	0.001	2	0.5	1	1	0.3	0.1959	0.2656	0.1087	0.3756	0.2521	0.3746
	1	1	0.001	1	0.5	1	1	0.3	0.2200	0.2984	0.1221	0.2984	0.2883	0.2974
Low entrepreneurial productivity	1	1	1	2	0.5	1	1	0.1	0.2167	0.2271	0.2394	0.3212	0.2143	0.3202
	1	1	1	1	0.5	1	1	0.1	0.2391	0.2507	0.2642	0.2507	0.2365	0.2497
Higher market goods productivity	1	1	1	1	0.5	2	1	0.3	0.3637	0.2746	0.3075	0.2746	0.1452	0.2736
	1	1	1	2	0.5	2	1	0.3	0.3266	0.2466	0.2762	0.3488	0.1304	0.3478
Lower market goods productivity	1	1	1	1	0.5	0.5	1	0.3	0.1352	0.2253	0.2886	0.2253	0.2629	0.2243
	1	1	1	2	0.5	0.5	1	0.3	0.1236	0.2061	0.246	0.2916	0.2405	0.2905
Higher home productivity	1	1	1	1	0.5	1	2	0.3	0.2422	0.2724	0.3222	0.3852	0.2144	0.1921
	1	1	1	2	0.5	1	2	0.3	0.2244	0.2523	0.2984	0.5045	0.1986	0.2518
Lower home productivity	1	1	1	1	0.5	1	0.5	0.3	0.2035	0.2288	0.2706	0.1618	0.1801	0.3215
	1	1	1	2	0.5	1	0.5	0.3	0.1795	0.2018	0.2387	0.2018	0.1589	0.4016
Higher leisure preference	1	2	1	1	0.5	1	1	0.3	0.2033	0.3232	0.2703	0.2286	0.1799	0.2276
	1	2	1	2	0.5	1	1	0.3	0.1857	0.2953	0.247	0.2953	0.1644	0.2943
Higher entrepreneurial productivity	1	1	1	1	0.5	1	1	0.6	0.2313	0.2606	0.3632	0.2606	0.1175	0.2596
	1	1	1	2	0.5	1	1	0.6	0.2088	0.2353	0.3279	0.3327	0.1061	0.3317
Lower entrepreneurial productivity	1	1	1	1	0.5	1	1	0.05	0.2445	0.2505	0.257	0.2505	0.2439	0.2495
	1	1	1	2	0.5	1	1	0.05	0.2216	0.2270	0.2329	0.3211	0.2210	0.3201
Low entrepreneurial productivity and culture	1	1	0.001	1	0.5	1	1	0.05	0.2932	0.3219	0.0223	0.3219	0.3358	0.3209
	1	1	0.001	2	0.5	1	1	0.05	0.2588	0.2841	0.0197	0.4018	0.2964	0.4008

Appendix B: US Immigrant stocks in 2000 and the conditional entrepreneurial culture coefficients (male and female together)

In figure B1 it is apparent that Mexican immigrants dominate the immigrant stock of this sample and Mexicans also have the lowest conditional entrepreneurial culture coefficient. Apart from this outlier there is no apparent relation in the scatter; highly entrepreneurial cultures as measured here are not associated with either unusually large or unusually small stocks of immigrants.

This conclusion is confirmed by Huber robust regression (standard errors in parentheses) in which the coefficients are not significantly different from zero;

$$\underset{}{\text{culture\_coefficient}} = \underset{(0.0027)}{0.00463} - \underset{(-9.11\text{x}10^{-08})}{9.58 \text{ X } 10^{-08}} \text{ stock\_of\_all\_immigrants}$$

A similar result is obtained using the stock of immigrants in the non-agricultural workforce as an explanatory variable.

Figure B1 Scatter Plot of Logit Marginal Effects versus Stock of Immigrants