“How internet penetration into rural communities changes demographics of rural entrepreneurs”

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How internet penetration into rural communities changes demographics of rural entrepreneurs

Abstract

A structural equation model is estimated in order to investigate whether availability of Internet access affects the demographic profile of nascent entrepreneurs in rural areas. We find that a push effect of low-income is counteracted by the inability to be online; less educated and older individuals are less likely to start their own business in a new environment, while more educated and younger individuals are more likely to do so. The results also suggest that households with children might be more comfortable with self-employment in the post-Internet environment than they were in the pre-Internet environment.

Keywords: rural entrepreneurship, internet adoption, demographics.

Introduction

Entrepreneurship was traditionally considered a sustainable development strategy for rural communities, where regular employment is often unavailable for a variety of reasons (e.g., Lewis, 1954; Harris and Todaro, 1970). Therefore, researchers and practitioners have been interested in factors that facilitate entrepreneurial activities among rural residents.

Many researchers pay particular attention to nascent entrepreneurs (startups in their planning phase) for two reasons. First, entrepreneurial intentions remain the best single predictor of entrepreneurial behavior (Krueger, 2000; Shepherd and Krueger, 2002). Second, Krueger (2008) suggests that the failure of an intention to be realized as an action might reflect a barrier to the action (e.g., insufficient resources, social norms, lack of information and/or expert advice) that could be compensated by the appropriate policies. Existing literature suggests that major determinants of entrepreneurial intentions include unemployment, lack of income, fear of job loss, dissatisfaction with the entrepreneur's previous job (e.g., Cromie and Hayes, 1991), as well as potential for increased life satisfaction (e.g., Schjoedt and Shaver, 2004). In addition, demographic factors such as gender, age, education level, marital status, and ethnicity are repeatedly reported as strong correlates of entrepreneurial intentions and actions (see Gartner et al., 2004 for a review).

Demographic factors are easily observable. Consequently, various entrepreneurial educational and support programs were designed for demographic groups that have been shown to have particular problems related to entrepreneurial activities. For example, women and minorities have been shown to have greater challenges in accessing funding, major accounts, and government contracts (Brush et al., 2008). Practitioners and policy makers took into account this result: In addition to the programs that target all demographic groups equally (e.g., Small Business Development Centers, industrial extension programs, business incubators, science parks), various educational and support programs target exclusively females (e.g., Annie's Project) or minorities (e.g., Minority Entrepreneurship Program).

The advent of the Internet in rural areas is expected to change their economic environment dramatically. Some researchers predict that Internet availability promotes rural development. Varian et al. (2002) note that the Internet can compensate for business distance from major markets by increasing market choices, information choices, and continuous education opportunities. Lehr et al. (2006) suggest that availability of the Internet has a positive effect on entrepreneurial intentions and actions; and therefore communities without Internet access may lag in employment growth and number of businesses. Other studies are more cautious in their conclusions about the effects of Internet penetration on rural development. For instance, Cumming and Johan (2009) suggest that the effect of Internet adoption may not necessarily be homogeneous across regions, communities, and industries.

Some studies suggest that even in communities where broadband Internet is available, not all demographic groups take equal advantage of Internet access (Bimber, 2000). In particular, age, income, education, and social standing have been shown to correlate positively with user demand for Internet services (Dwivedi and Lal, 2007). Furthermore, females are found to use Internet services less often than men (Bimber, 2000). The documented correlation of demographic characteristics and both the tendencies to adopt and use the Internet and to form entrepreneurial intentions motivate the research question of the present study. In particular, we ask:

If different demographic groups adopt the Internet at different rates, and the Internet has a positive effect on entrepreneurial intentions, does the Internet penetration change the demographic profile of nascent entrepreneurs in rural areas?

In order to answer this question, we employ a structural equation model (SEM) approach. Unlike ANOVA, logit, or probit models, SEM can not only investigate the correlation between demographic characteristics and entrepreneurial intentions, but also examine separately the direct and indirect (through the mediating effect of Internet access availability) effects of demographic characteristics on entrepreneurial intentions.

The rest of the paper is organized as follows: The next section reviews relevant literature on entrepreneurship and technology adoption. This is followed by sections presenting the methodology and results of the analysis. The concluding section discusses policy implications of the results.

1. Demographics, entrepreneurship, and Internet adoption

The present study builds on findings from three research areas: (i) demographics of entrepreneurship, (ii) determinants of Internet adoption and use, and (iii) the role of Internet in the development of new businesses and their success. This section provides a brief review of the relevant literature in each of the three areas.

1.1. Demographics of entrepreneurship. A number of studies reported a strong correlation between entrepreneurial intentions and actions and demographic factors such as household income, age, ethnicity, gender, education, and marital status. For instance, the rates of nascent entrepreneurship are reported to be highest in the age category of 25 to 34 years old (Reynolds, 1997). The probability of starting a new business declines with age (Reynolds, 1997), with the effect shown to be stronger for women than for men, especially in transition economies (Lauxen-Ulbrich and Leicht, 2002).

Aldrich and Waldinger (1990) report distinctions in the rate of entrepreneurship across ethnic groups and connect them to disparity in resources available to different ethnic groups. Other research suggests that low-income individuals are often pushed into entrepreneurship by insufficient income (Verheul et al., 2002).

Males are found to be more active as entrepreneurs than females (Reynolds, 1997). On the other hand, females are reported to be less likely to have strong ties to the workplace (Briton, 1998) and more likely to become entrepreneurs when facing limited employment options.

Females are also found to be more likely to withdraw from employment when they reach the child-rearing age and return to employment later when their children have grown up (Charles et al., 2001). Furthermore, households with growing children often have to rely on a single income, since mothers often do not consider regular employment or entrepreneurship as an acceptable option during this time (Charles et al., 2001).

Overall, the family structure strongly affects an individual's decision to choose self-employment over a wage employment. Generally, if the head of a household is responsible for maintaining the family, he or she is more likely to prefer activities that involve fewer risks (Unger and Crawford, 1992; OECD, 2001).

The effect of education on entrepreneurial actions is generally found to be nonlinear. For instance, both the individuals with only a high school education and those with more than a college education are more likely to start their own business than other education groups (Dickson et al., 2008).

1.2. Determinants of Internet adoption and use. Existing theories of technology adoption (Davies, 1979; Mahler and Rogers, 1999) suggest that the penetration rate over time follows an S-curve with three well-defined stages in the adoption process. During the first stage, the rate of adoption is relatively low, as only early adopters take up the technology. During the second stage, the rate of adoption is the highest, and a majority of the potential users start utilizing the technology. During the third and final stage, the rate of adoption slows down as late adopters join in (if they ever do). Chaudhuri et al. (2005) suggest that the U.S. is now at the third stage of Internet adoption and that the penetration rate is leveling. However, they also recognize the lag in Internet adoption among rural households.

A number of studies document correlations between demographic factors and Internet adoption and use. For instance, the National Telecommunications and Information Administration (NTIA 1995, 1998, 1999, and 2000) reports correlations between Internet adoption and usage and four demographic characteristics – household income, education level, race, and age. These findings are supported by Choudrie and Dwivedi (2006) who also find age, gender, income, and education to be the factors distinguishing between adopters and non-adopters.

Empirical studies suggest that early adopters of Internet are more entrepreneurial, wealthier, and

more educated (Leamer and Storper, 2001). Most surveys also find that income positively correlates not only with the access-at-home, but also with the access-at-large (NTIA 1998, 1999, 2000 and 2002; Leigh and Atkinson, 2001). Well-educated married white or Asian individuals are more likely to be online than those not sharing these characteristics. Furthermore, females, from approximately age 20 to age 50, are more likely to be Internet users than men. From about age 60 and older, men have higher rates of Internet use than women (NTIA 2001, 2002).

Finally, due to the novelty of Internet technology and its association with computers, younger individuals are presumed to be more inclined to access the Internet than older ones (NTIA 2002).

1.3. Internet and businesses development and success. The importance of an infrastructure that supports knowledge transmission and communication for entrepreneurship is emphasized by many researchers (cf. Audretch, 2007a, b). Lumpkin and Dess (2004) describe how four Internet-specific activities – search, evaluation, problem-solving, and transaction – add value to businesses. Empirical studies attribute the acceleration of productivity growth in the United States since 1995 to the greater investment in information and communication technologies (Jorgenson, 2001). Lehr et al. (2004) report that communities, where mass-market Internet was available by December 1999, experienced more rapid growth in employment, the number of businesses overall, and businesses in IT-intensive sectors between 1998 and 2002. More recently, Crandall et al. (2007) find similar results, though the scope of their analysis is limited to employment and output only. Furthermore, many researchers speculate that Internet availability might be particularly valuable to the remote rural communities since it can compensate to some degree for distance from major markets (e.g., Stenberg and Morehart, 2006).

Other studies are more cautious and advocate a more careful consideration of Internet adoption's effects while acknowledging its positive impact. In particular, it is suggested that the effect of Internet adoption may not necessarily be homogeneous across regions, communities, and industries.

For instance, ConnectKentucky Technology collected data on Internet availability in Kentucky counties in September of 2007. Nearly 11,000 adults representing each of Kentucky's 120 counties were surveyed on their use of computers, the Internet, and technology in general. Shideler et al. (2008) used a modified growth model as the theoretical foundation for the linear regression analysis of this data to investigate the relationship between Internet adoption (i.e., the number of households subscribing to high-speed broadband service) in Kentucky counties and employment growth in these counties. They find that Internet deployment positively correlates with employment growth in mining, construction, and information, administration, support, waste management, and remediation services. However, they also find that Internet adoption negatively correlates with employment growth in accommodation and food services.

Cumming and Johan (2009) find that Internet availability may reduce profits for small firms in remote locations by increasing the degree of competition. Consequently, while Internet adoption may facilitate entrepreneurship in larger Internet communities through agglomeration across areas with pre-existing clusters of real entrepreneurial activities, it may also result in a decrease of entrepreneurship in smaller and more geographically remote Internet communities. In fact, Galloway (2007) questions whether Internet access in rural areas has the potential to contribute to economic development at all. In particular, she finds that rural businesses tend to lack propensity for growth and diversification and therefore accessibility for them may be an issue secondary to lack of enterprise activity in rural areas. The conflicting reports about the effect of Internet diffusion on rural communities suggest that more research is needed in this area.

To summarize, the literature suggests different demographic groups engage in entrepreneurial activity and adopt/use the Internet at different rates. Since Internet access may help to start one's own business, the availability of Internet access may trigger growth in the number of startups among the demographic groups that adopt and use Internet more actively (e.g., white, educated, younger, married individuals with higher income). In addition, the availability of Internet access might increase the number of female entrepreneurs of a child-bearing age, since they may decide to engage in home based e-commerce while staying home and taking care of their children. Consequently, the pre-Internet demographic profile of nascent entrepreneurs might change in the wake of wider availability of Internet access.

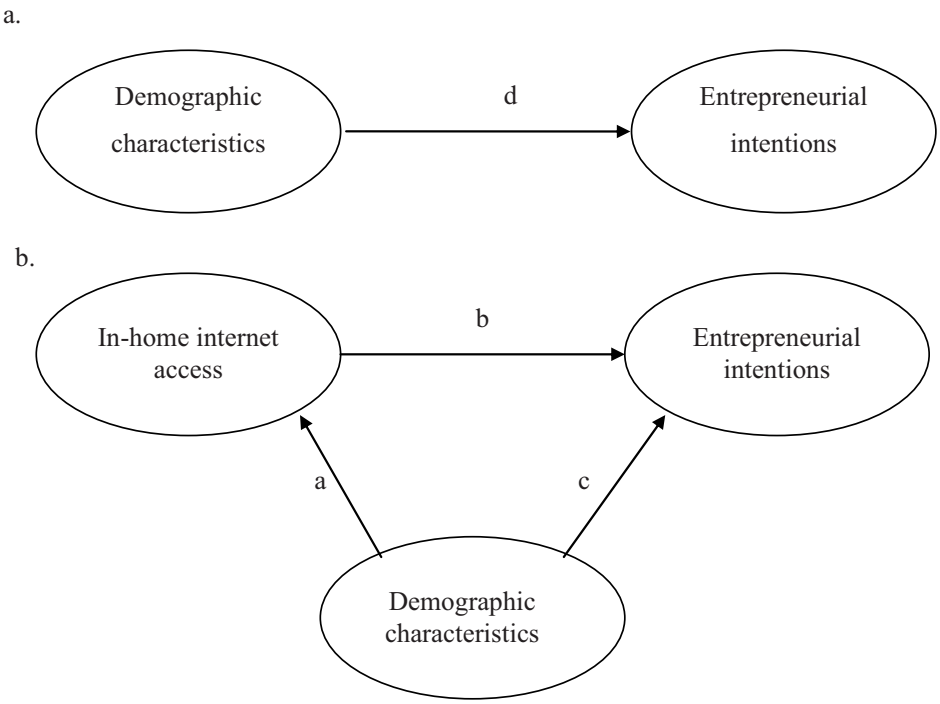
2. Research methodology

2.1. General approach. The general goal of this study is to evaluate the effect of Internet access availability on the demographic profile of nascent entrepreneurship in rural areas. Univariate or multivariate ANOVA is traditionally used to evaluate differences between groups of individuals based on their characteristics. The binary choice models, such as probit and logit, are also often used for analysis of

determinants of a choice among multiple options. However, it is also recognized that ANOVA, probit and logit models were primarily designed for identifying predictors. They are not well suited for studying interdependent systems because they do not capture well the indirect effects (i.e., relationship between two variables through a third variable).

The probit and logit models may capture the indirect effects to some degree through the interaction terms, but they both test only correlations and not the casual relationships between variables. However, structural equation models (SEM) are best suited for the estimation of causal relationships, as well as direct and indirect effects (Jöreskog and Sörbom 1984). Since the demographic variables are expected to correlate with both the entrepreneurial actions and the decision to adopt the Internet, and Internet adoption in turn is expected to trigger entrepreneurial actions, the SEM approach is ideally suited for the purposes of the present study.

The path diagram presented in Figure 1 is the first step in constructing a structural equation model.



Notes: *a* – direct effect of demographic characteristics on in-home Internet adoption; *b* – direct effect of in-home Internet adoption on entrepreneurial intentions; *c* – direct effect of demographic characteristics on entrepreneurial intentions; *a*+*b* – indirect effect of demographic characteristics on entrepreneurial intentions through the mediating effect of in-home Internet access; *d*=*a*+*b*+*c* – total effect of demographic characteristics on entrepreneurial intentions.

Fig. 1. Direct, indirect and total effects of demographic characteristics on the entrepreneurial actions

Figure 1(a) shows the (overall) correlation of demographic characteristics and the probability of forming entrepreneurial intentions (i.e. the *total* effect of demographic characteristics on entrepreneurial intentions, arrow *d*). However, the observed correlation between the two cannot reveal the mediating effect of Internet access availability on entrepreneurial intentions. Therefore, Figure 1(b) decomposes the total effect into *a direct* effect and *an indirect* effect of demographic characteristics on entrepreneurial intentions. The former reflects the impact of demographic characteristics on the probability of forming entrepreneurial intentions (arrow *c*). The latter represents a combination of the direct impact of demographics on the adoption of in-home Internet (arrow *a*) and a direct impact of in-home Internet access on entrepreneurial intentions (arrow *b)*. Taken together (arrow *a* + arrow *b* + arrow *c*), these effects represent the total effect of demographic characteristics on forming entrepreneurial intentions.

The importance of this diagram is in decomposition of direct and indirect effects of the demographic variables. For example, as discussed earlier, literature suggests that low income has a positive direct effect on entrepreneurial intentions and actions ($c>0$ in Figure 1b). At the same time, low income is found to have a negative direct effect on Internet adoption ($a<0$ in Figure 1b). Finally, the literature suggests that in-home Internet access increases the probability of forming entrepreneurial intentions in individuals ($b>0$ in Figure 1b). However, if low-income individuals are not likely to pay for in-home Internet access, then their entrepreneurial intentions are not likely to be

positively affected by the availability of Internet access to the same extent as entrepreneurial intentions of individuals with higher income ($a+b<b$ in Figure 1b). Furthermore, if the negative effect of low income on the probability to adopt in-home Internet access is strong enough ($-a>b$ & $a+b<0$ in Figure 1b), then low income individuals are less likely to be represented among nascent entrepreneurs in the post-Internet environment as they were in the pre-Internet environment ($a+b+c<c$ in Figure 1b). Since the overall effect of the demographic variables is now a composite of two effects, prior literature can be relied upon only to suggest qualitative changes in correlation between demographic characteristics (i.e., income, gender, marital status, age and education) and entrepreneurial intentions. The present paper tests whether the mediating effect of the Internet on the relationship between demographic characteristics and entrepreneurial intentions is likely to be statistically significant.

2.2. The model. The theoretical relations shown in Figure 1 can be represented through the system of structural equations (Jöreskog and Sörbom, 1984).

$$\eta = \mathrm{B}\eta + \Gamma\xi + \zeta$$

$$\begin{bmatrix}\eta_1\\ \eta_2\end{bmatrix} = \begin{bmatrix}0 & 0\\ \beta & 0\end{bmatrix}\begin{bmatrix}\eta_1\\ \eta_2\end{bmatrix} + \begin{bmatrix}\gamma_{11} & \cdots & \gamma_{1k}\\ \gamma_{21} & \cdots & \gamma_{2k}\end{bmatrix}\begin{bmatrix}\xi_1\\ \vdots\\ \xi_k\end{bmatrix} + \begin{bmatrix}\zeta_1\\ \zeta_2\end{bmatrix}, \quad (1)$$

where η_1 and η_2 are dependent (endogenous) variables (in-home Internet access and entrepreneurial actions, respectively), ξ is the vector of independent (exogenous) variables, β is a coefficient relating the dependent variables, Γ is a matrix of unknown coefficients that reflects the influence of the exogenous variables on the endogenous variables, and ζ is a vector of error terms.

The arrows in Figure 1b are assumed to support the argument that in-home Internet access drives (influences) entrepreneurial intentions. However, as a starting point at the estimation stage, we use bi-directional arrows to represent the relationships between the two variables – in-home Internet access and entrepreneurial intentions – without an explicitly defined causal direction. This approach is used because these variables may potentially affect each other. That is, not only does Internet access positively affect entrepreneurial intentions, but also individual entrepreneurial intentions might influence individual decision to acquire in-home Internet access. The more general relation can be also represented through the system of structural equations (1) (Jöreskog and Sörbom, 1984) but with the matrix B of the general form.

$$B = \begin{bmatrix}0 & \beta_{12}\\ \beta_{21} & 0\end{bmatrix}.$$

For both models we compute and compare goodness of fit (GOF) indices which include χ^2/DF, RMSEA, CFI and IFI. The baseline model is analyzed using the Amos 4.0 program (Arbuckle and Wothke, 1999). The model with the best fit should prove the directional influences (Clissold, 2004).

Since we are particularly interested in possible indirect effects of the demographic variables on the probability of starting one's own business through the effect on Internet adoption, we also employ the Sobel test to determine whether the observed indirect effects are statistically different from zero. Specifically, we define the indirect effect as a product of the direct effect, a, of demographic variables on Internet access and the direct effect, b, of the Internet access on entrepreneurial action (Figure 1). The standard error of the indirect effect, s_{ab}, is then given by

$$s_{ab} = \sqrt{b^2 s_a^2 + a^2 s_b^2 + s_a^2 s_b^2}. \quad (2)$$

The Sobel test suggests that the indirect effect is significant if the ratio ab/s_{ab} is greater than a critical value from the standard normal distribution appropriate for a chosen level of statistical significance (Sobel, 1982).

2.3. Data. *2.3.1. Background*. To evaluate the effect of Internet access availability on the demographic profile of nascent entrepreneurship in rural areas, the present paper uses the unique dataset collected in rural Kentucky (a southern state of U.S.) between summer of 2005 and summer of 2006. It is worth noting that rural development is a particularly important problem for Kentucky, since 52 percent of the state population lives in rural areas compared to 18 percent nationwide (Innovation and Information Consultants, 2006). According to the U.S. Bureau of Labor Statistics, per capita income in Kentucky, while following a similar trend, lagged behind the U.S. average over the last 10 years. For instance, in 2006, per capita income was $36,714 in the U.S. and $29,729 in Kentucky. The unemployment rate in Kentucky has been traditionally higher than the national average (6.1 percent vs. 5.1 percent, respectively, in 2005). Finally, per capita income in nonmetropolitan areas of Kentucky was more than $10,000 below that in metro areas ($23,751 vs. $34,219). In 2005, twenty-five nonmetropolitan Kentucky counties reported unemployment rates more than 1.5 times higher than the U.S. average. In 2005, the poverty rate in Kentucky was estimated at 16.9 percent compared to 13.3 percent in the U.S.

overall. Since entrepreneurship has been suggested as a viable alternative to industrial recruitment and a sustainable rural development strategy (e.g., Petrin, 1994) a number of various educational and support programs were developed in Kentucky to promote rural entrepreneurship (Scorsone, 2003). Some of them (e.g., Annie's project) targeted particular demographic groups.

On the other hand, in 2002 the state initiative ConnectKentucky was founded to spread broadband access around the state. In order to achieve its goal, ConnectKentucky identified areas that were not served and educated these communities about broadband value, therefore raising demand and making the areas more attractive to broadband service providers. The program was reportedly one of the most successful programs of its kind (The Tennessee Broadband Task Force, 2007). For instance, it was able to raise broadband usage in Kentucky from 60 percent of that state's households to 90 percent by the end of 2006. Consequently, a question of whether the Internet diffusion significantly affects correlation between demographic characteristics and entrepreneurial intentions/actions of rural residents had become very important for existing and planned entrepreneurial educational and support programs in Kentucky.

2.3.2. Data collection. The data used for the present analysis was collected in 2005-2006. A stratified random sample (counties being the strata) of 5,000 households was drawn from the list of Kentucky rural residents supplied by the local county extension agents. Each of these households received a questionnaire that addressed a comprehensive set of issues related to entrepreneurial intentions, personal, family, business, and community characteristics, and availability and use of Internet in their homes. The questionnaire was developed by a group of researchers at the University of Kentucky, pretested with the members of the Kentucky Farm Bureau, and is available upon request. Approximately 200 randomly selected individuals among those who did not respond to the mailed survey received a follow-up phone call (a stratified random sample, counties being the strata). Overall, 702 responses were collected. Three hundred and sixty nine of the respondents (about 53 percent of the sample) indicated that they have home access to the Internet[1]. One hundred and twenty five respondents (about 17.8 percent of the sample) indicated that they are planning to start their own business.

In addition to the survey, the analysis also used data on the rate of Internet adoption in each of Kentucky Counties in 2005-2006 collected by ConnectKentucky. Figure 2 (adopted from the ConnectKentucky website) depicts Internet availability by Census Block in Kentucky in 2006.

[1] We did not differentiate between dial-up and broadband connection.

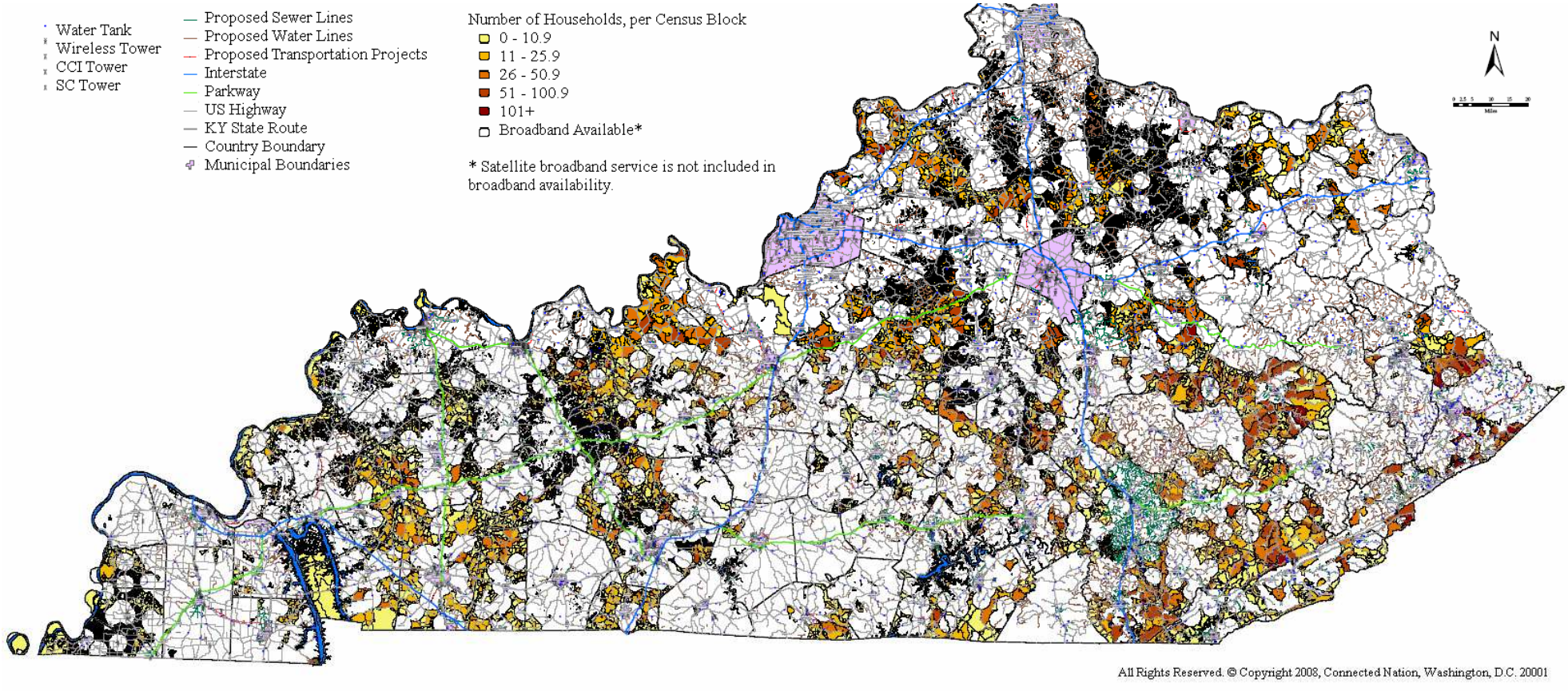


Fig. 2. Number of Households Unserved by a Broadband Provider by Census Block

2.3.3. Sample limitations. The relatively low response rate (~14%) suggests that our sample is potentially subjected to a response bias, and might be related to two factors. First, the survey was long (it contained approximately 60 questions about personal, farm, household and community characteristics). Second, the target group was a rural Kentucky population (mostly farmers) who may be reluctant to participate in research studies.

We analyzed 702 surveys, which is significantly less than the number of subjects used in other field studies (often several tens of thousands respondents). Nevertheless, our sample is very compelling because it gives us a unique opportunity to analyze what factors correlate with entrepreneurial intentions of rural residents during a period of major transition in their local economy.

Although our sample cannot be considered fully representative of the rural Kentucky population, we believe it is sufficiently large to investigate how Internet availability affects the relationship between demographic characteristics and entrepreneurial intentions. In support of this claim, we later evaluate whether the apparent response biases are likely to affect our results.

Finally, since we use only Kentucky rural residents in our survey, it is not clear whether we can generalize our results to a larger population (e.g., Midwest, US). We chose Kentucky for two reasons. First, Kentucky is predominantly a rural state, and we are interested in nascent entrepreneurs in rural areas. Second, broadband usage in Kentucky was approximately 90 percent by the end of 2006 (recall that approximately 52% of Kentucky population lives in rural areas), which suggests that the Internet was available in most rural counties in 2005-2006 when the data were collected.

2.4. Variables. The dependent variable in the model is the binary variable NE (nascent entrepreneur). The latter was coded depending on the responses to two survey questions, namely "Are you planning to start a new business?" and "Which steps have you taken toward starting your new business?" The respondents who indicated that they are planning to start a new business and already took at least one step toward starting a new business (financing, marketing, or production) were considered nascent entrepreneurs and coded as NE = 1. The rest of the respondents were coded as NE = 0.

The hypothesized mediating variable INTERNET was coded 1 if the respondents answered "yes" to the question: "Do you have Internet access from your home?" and also indicated that they actively participated in one or more online activities[1] during 2003 and 2004[2].

The survey did not differentiate among the types of Internet access (e.g., dial-up, broadband), since the present study is primarily concerned with an overall effect of Internet availability and use on demographics of entrepreneurship[3].

INTERNET is hypothesized to be positively correlated with NE (i.e., b>0 in Figure 1). Note that the survey asked about entrepreneurial intentions in the present tense, but asked about availability of the Internet in the past tense. The questions was intentionally formulated in that manner in attempt to separate in time the availability of the Internet (at least two years earlier) and formation of entrepreneurial intentions (the present) even though the data was collected at a single point in time[4].

The estimated models included total of 12 explanatory variables summarized in Table 1.

Table 1. Description of variables

Variable	Description and units
NE	=1, if working on starting a new business, 0 o/w
INTERNET	=1, if Internet is available at home and was used for more than a year, 0 o/w
AGE	Age, 10 years
ADRATE	rate of adoption in the county, %
ADRATE2	square of the rate of adoption in the county, %^2
RACE	=1, if white, 0 o/w
LINCOME	=1, if income is less than $30,000, 0 o/w
INCOME2	=1, if income is greater than $30,000 less than $80,000, 0 o/w
INCOME3	=1, if income is greater than $80,000 less than $120,000, 0 o/w
INCOME4	=1, if income is greater than $120,000, 0 o/w
NOHIGHSCHOOL	=1, if no high school completed, 0 o/w
HIGHSCHOOL	=1, if high school completed, 0 o/w
COLLEGE	=1, if at least some college completed, 0 o/w
GRAD	=1, if more than college completed, 0 o/w
GENDER	=1, if female, 0 o/w

[1] The activities listed in the survey included sending e-mails, searching for information online, selling or buying items on Internet, filling out tax forms online, banking, etc.
[2] Years preceding the period when the data was collected.
[3] Future research may look specifically at the effect of high-speed Internet access given availability of data.
[4] Of course, a longitudinal data would allow a greater confidence in separating these two events in time, thus providing stronger support for assumed causality (Internet access influences entrepreneurial intentions). This analysis could be a topic for future research.

Table 1 (cont.). Description of variables

Variable	Description and units
MGENDER	=1, if married female, 0 o/w
MARRIED	=1, if married, 0 o/w
CHILDREN	=1, if there are kids in the household, 0 o/w

Nine variables represent the demographic profile of the respondents. AGE describes the respondent's age in decades. The binary variable GENDER is coded 1 for females and 0 for males. The binary variable MARRIED is equal to 1 if the respondent is married, 0 otherwise. The binary variable MGENDER reflects the interaction term between GENDER and MARRIED. The binary variable LINCOME is equal to 1 for the household income less than $30,000 a year, otherwise 0. The binary variable CHILDREN is equal to 1 if the respondent's household included dependents younger than 18, otherwise 0. The variable RACE is equal to 1 for Caucasian and 0 otherwise. Education is measured by three binary variables reflecting the highest achieved level of education, namely NOHIGHSCHOOL equal to 1 if the respondent did not receive a high school diploma, HIGHSCHOOL equal to 1 if the respondent received a high school diploma, and GRAD equal to 1 if the respondent received more than a college education. A college degree is used as a baseline education level.

Two variables, ADRATE and ADRATE2, were included in the analysis in order to control for the effects predicted by the technology adoption model; namely, that early adopters are more entrepreneurial, wealthier, and more educated. The ADRATE reflects the Internet adoption rate in the respondent's community in 2007 (collected by ConnectKentucky, 2007) and thus is the upper-bound proxy for the actual adoption rate in the respondent's county during the 2005-2006 period. The squared term is included in order to capture the nonlinear effect. We expect ADRATE to be positively correlated with INTERNET. Recall that literature on technology adoption suggests that the penetration rate over time follows an S-curve with three well-defined stages in the adoption process. Positive correlation of ADRATE2 with INTERNET could indicate that the adoption process is at its first (early) stage, while negative correlation of ADRATE2 with INTERNET could indicate that the adoption process is at its third (final) stage.

2.5. Hypotheses. Following the results available in the literature we formulated a series of testable hypotheses. Recall that indirect effect of a demographic characteristic on NE ($a + b$ in Figure 1) is composed of the direct effect of the characteristic on INTERNET (a in Figure 1) and the direct effect of INTERNET on NE (b in Figure 1, hypothesized to be positive). Consequently, for each demographic characteristic (j=1,…, 9) we formulate a hypothesis about its direct effect on INTERNET (a_j) as well as its direct (c_j) and indirect (a_j+b) effects on NE.

Specifically, we expect that MARRIED correlates positively with INTERNET ($a_m>0$), negatively with NE ($c_m<0$), and that the overall indirect effect is positive and statistically significant ($a_m+b> 0$). In other words, we expect that married individuals are more likely to form entrepreneurial intentions in the post-Internet environment than in the pre-Internet environment.

We expect GENDER to positively correlate with INTERNET ($a_g>0$), negatively with NE ($c_g<0$), and its overall indirect effect to be positive and statistically significant ($a_g+b>0$). We also expect that interaction term MGENDER negatively correlates with NE ($c_{mg}<0$), but positively with INTERNET ($a_{mg}<0$), and that its indirect effect on NE is positive and statistically significant ($a_{mg}+b>0$). In other words, we expect that females, and particularly married females, are more likely to attempt to start a new business in the post-Internet environment than in the pre-Internet environment.

We expect that CHILDREN correlates positively with INTERNET ($a_{ch}>0$), negatively with NE ($c_{ch}<0$), and its overall indirect effect is positive and statistically significant ($a_{ch}+b > 0$). That is, we expect that families with children are more entrepreneurial in the post-Internet environment than in the pre-Internet environment.

We expect that RACE correlates positively with INTERNET ($a_{eth} > 0$), negatively with NE ($c_{eth} < 0$), and its overall indirect effect is positive and statistically significant ($a_{eth}+b>0$). That is, we expect that in the post-Internet environment minorities are more active in entrepreneurial activities than they were in the pre-Internet environment.

We expect COLLEGE to correlate positively with both INTERNET and NE ($a_{coll}>0$, $c_{coll}>0$), and the overall indirect effect to be positive and statistically significant ($a_{coll} + b>0$). In other words, we expect that in the post-Internet environment nascent entrepreneurs are more likely to have at least some college education than in the pre-Internet

environment. We also expect that NOHIGHSCHOOL correlates negatively with INTERNET (a_{nhs}<0), and positively with NE (c_{nhs}<0). However, we cannot make any definite predictions about the indirect effect of NOHIGHSCHOOL on NE ($a_{nhs} + b$ has an ambiguous sign).

Finally, we expect that AGE correlates negatively with both INTERNET and NE (a_{age}<0, c_{age}<0) and LINCOME correlates negatively with INTERNET (a_l<0) and positively with NE (c_l<0), but we cannot make any definite predictions about the indirect effect of AGE and LINCOME on NE (both $a_{age}+b$ and a_l+b have ambiguous sign).

3. Results

3.1. Descriptive statistics. The descriptive statistics of the variables are reported in Table 2. The first column in Table 2 reports the overall sample statistics, the second column reports the descriptive statistics of the subsample constructed from the individuals who have Internet access at home, the third column shows the descriptive statistics of the subsample constructed from individuals who were engaged in entrepreneurial activities. Finally, the fourth column reports the overall state statistics (USDA).

Table 2. Descriptive statistics

	Overall sample		Nascent entrepreneurs		Internet access and use		Kentucky
	Mean	Std. deviation	Mean	Std. deviation	Mean	Std. deviation	Mean*
AGE	5.45	1.5177	5.085	1.429	5.1	1.30	5.48
ADRATE	0.29	0.12688	0.2911	0.12579	0.2838	0.12035	0.29
	%	#	%	#	%	#	%
RACE	**96**	644	89	108	96	350	**91**
LINCOME	16	103	25	30	9	30	-
NOHIGHSCHOOL	**7**	47	4	5	2	8	**21**
HIGHSCHOOL	**27**	182	23	28	20	71	**61**
GRAD	**22**	148	28	34	30	108	**5**
GENDER	**23**	155	26	32	22	82	**50.5**
MARRIED	**80**	538	75	92	85	308	**73**
CHILDREN	29	195	36	43	36	129	31.5
NE	18	125	NA	NA	21	79	17
INTERNET	53	369	63	79	NA	NA	54

Note: Variables that are misrepresented in our sample at 5% significance level are in bold and underlined; * The data reported in the last column was borrowed from the USDA Rural Development program report; it does not contain standard deviations.

The descriptive statistics (see Table 2) indicate that the education level of the respondents in our sample is higher than the Kentucky average, and that females and single individuals were underrepresented, and white individuals were overrepresented in the sample (z-stat >1.96, p>0.05). Underrepresentation of females in our sample is not very surprising, given that we targeted households and not individuals. Clearly, it limits our ability to evaluate how the Internet influences the correlation between gender and entrepreneurial intentions. Later we evaluate whether the rest of apparent response biases affect our results.

The descriptive statistics also indicate that nascent entrepreneurs are more likely than rural residents who are not planning to start a new business to be white (p<0.01), are younger (p<0.01) with lower incomes (p<0.01) and are more likely to have Internet access (p<0.01). Individuals who have Internet access are younger (p<0.01), more educated (p<0.01) with higher income (p<0.01), and more likely to be married (p<0.01) and have children (p<0.01) than individuals who don't have in-home Internet access. All of these are consistent with the prior literature.

3.2. Multivariate ANOVA. First, we estimated the multivariate ANOVA model with the dependent variables AGE, RACE, LINCOME, NOHIGHSCHOOL, HIGHSCOOL, GRAD, GENDER, MARRIED, MGENDER, and CHILDREN in order to compare the demographic profile of entrepreneurs with and without Internet access at home[1]. Only LINCOME (F = 9.462, p = 0.003), NOHIGHSCHOOL (F = 32.53, p = 0.00), AGE (F = 5.809, p =.018), COLLEGE (F = 4.399, p = 0.038), and MGENDER (F = 2.807, p = 0.097), were significantly different between these two groups, which supports our hypothesis that the availability of the Internet affects the income and education profile of entrepreneurs in rural Kentucky. It also suggests that in-home Internet availability makes self-employment a more feasible option for married females. The effect of AGE only approached significance (F = 2.562, p = .11).

3.3. Structural equation analysis. We ran both bi-directional and causational SEMs described in the methods section[2]. The estimated GOF indices are shown in Table 3.

Table 3. Comparison of the fit of the causational and bi-directional models

Model fit measure	Causational model	Bi-directional model
Chi-square	30.5	30.4
df	25	24
CMIN	1.219	1.267
CFI	.999	.998
RMSEA	.018	.02

The causational model has a better fit than bi-directional model (Table 3). However, the SEM technique fails to determine with confidence whether INTERNET influences NE, or NE influences INTERNET (all GOF indices and coefficients are expected to be identical for both models; Bullock, Harlow and Mulaik, 1994). We hypothesize the former relation for theoretical and survey design reasons.

Table 4 summarizes the estimated coefficients for the causational model.

Table 4. Structural equations model analysis

Dependent variable	Internet home		Entrepreneurial actions	
	β	S.E.	β	S.E.
ADRATE	1.113	.826	-	-
ADRATE2	-1.912***	1.155	-	-
INTERNET	-	-	.065**	.031
MARRIED	.100***	.059	.022	.049
GENDER	.027	.085	.081	.070
MGENDER	.052	.099	-.095	.082
LINCOME	-.184*	.053	.140*	.044
HOHIGHSCHOOL	-.314*	.074	-.041	.062
HIGHSCHOOL	-.175	.043	-.018	.036
GRAD	.117	.046	.053	.038
AGE	-.067*	.013	-.026**	.011
RACE	.011	.088	-.277*	.072
CHILDREN	.075***	.042	.020	.034

Note: *, **, *** indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Model Fit: $X^2(20) = 30.5(25)$, p = .21.

The results are consistent with the preliminary expectations. Married respondents are found to be more likely to have Internet access at home, while low-income, older, and less educated respondents are less likely to do so.

The effect of the proxy for adoption rate in the respondents' counties was not significant, but the negative effect of ADRATE2 on INTERNET was. This result might reflect the fact that the process of Internet adoption enters its third and final stage in Kentucky, which corresponds to the last concave portion of the S-curve. Presence of children in the household positively correlated with the probability to adopt and use the Internet, which has a clear intuitive explanation. Children are much more comfortable with the new technology; they often have to use it at school or have a chance to access it at their friends' house. Therefore, households with children are more exposed to the influence of the Internet and thus more prone to adopting the technology.

Consistent with the expectations, availability of Internet access at home was found to positively correlate with the probability to start one's own business. Also consistent with the expectations was the result that lower-income, younger, and non-white respondents are more likely to start their own businesses.

However, the key results of this paper are the breakdown of the total (the last column), direct (the first column), and indirect (through Internet adoption, the middle column) effects of demographic variables on entrepreneurial actions (Table 5). The statistical significance of the total and direct effects was evaluated by estimating the structural equation models implied by Figures 1a and 1b, respectively. The Sobel test was then used to evaluate the statistical significance of the indirect effects.

Table 5. Direct, indirect and total effects of demographics and the variables on the probability to engage in entrepreneurial activities

	Effects on the dependent variable		
Independent variables	Direct	Indirect	Total
INTERNET	**.065**	NA	**0.065**
ADRATE	NA	0.073	0.073
ADRATE2	NA	**-0.125**	-0.125
AGE	**-.026**	**-0.004**	**-0.031**
RACE	**-.277**	0.001	**-0.276**
LINCOME	**.140**	**-0.012**	**0.128**
HOHIGHSCHOOL	-.041	**-0.021**	-0.061
HIGHSCHOOL	-.018	**-.011**	-0.029
GRAD	.053	**0.008**	0.061
GENDER	.081	0.002	0.083
MARRIED	0.022	**0.007**[a]	0.029
MGENDER	-.095	0.003	-0.091
CHILDREN	0.02	**0.005**	0.025

Note: Statistically significant effects at 10% significance level are in bold; [a] – statistically significant effect at 11% significance level.

The results strongly support the hypothesis that availability of Internet access modulates correlations between the demographic characteristics and entrepreneurial intentions of rural residents. In particular, the indirect effects were statistically significant for AGE (negative), LINCOME (negative), NOHIGHSCHOOL (negative), COLLEGE (positive), MARRIED (approached significance, positive), and CHLIDREN (positive). The results appear to suggest that certain demographic groups, such as married individuals with children and more educated individuals, are likely to be more active in their attempts to start a new business in the post-Internet environment than they were in the pre-Internet environment. On the other hand, demographic groups such as older, lower-income and less educated individuals appear to be less likely to be involved in entrepreneurial activities than they were in the pre-Internet environment. The effect of other demographic characteristics (RACE and GENDER) on entrepreneurial intentions was not mediated significantly by the availability of Internet access.

Note that the SEM results are different from the ones produced by multivariate ANOVA model. While both imply that availability of Internet access changes income and educational profiles of nascent entrepreneurs, they disagree about the effects of gender, family and age profiles on entrepreneurial intentions. The discrepancies are most likely due to the fact that SEM analysis accounts for correlation among demographic characteristics in the sample, whereas ANOVA does not have capability to do so.

3.4. Response biases. Finally, in order to evaluate the effect of response bias, we included interaction terms of the variable MARRIED, the variable GRAD, and the variable RACE with all other variables included in the final model. This allowed us to measure the effect (if any) that the higher proportion of more educated, white and married farmers in our sample would have on our results.

Neither of three the biases detected in our sample ("education", "married", and "race") appeared to interfere with the correlation between demographic characteristics and availability of the Internet access. The positive effect of the variable MARRIED approached significance among individuals with low education ($p=0.1$), while it was significantly lower among individual with graduate degree ($p<0.01$), which suggests that potentially we could have underestimated the average direct effect of marital status on entrepreneurial intentions. Since the indirect effect of MARRIED on NE is positive, potentially, the total effect of MARRIED on NE could be significant in a more representative sample.

The direct effect of low income on NE was significant among individuals with less and more educations ($p<0.02$). However, it was significantly stronger ($p<0.01$) among individuals with more education. This result suggests that we probably overestimated the magnitude of the direct effect of low income on the entrepreneurial intentions (but not the significance). Since the indirect effect was negative and consistent across groups with different education level, potentially, the total effect of LINCOME could be of a low magnitude in the more representative sample.

Finally, race of single individuals did not correlate with entrepreneurial intentions, but the interaction term WHITE x MARRIED was significant ($p<0.05$). This finding suggests that we potentially

overestimated the negative direct effect of race on the entrepreneurial intentions. But since the indirect effect of RACE on NE was insignificant across all groups, ethnic profile of entrepreneurs with Internet access is the same as that of entrepreneurs without Internet access.

These findings suggest that response biases detected in our sample do not affect our result that as the Internet diffuses into rural areas, older and low income individuals are less likely and married rural residence with children are more likely to form entrepreneurial intentions.

4. Discussion and policy implications

Varian et al. (2002) suggest the Internet can compensate for business distance from major markets by increasing market choices, information choices, and continuous education opportunities for rural residents. On the other hand, Galloway (2007) argues that Internet accessibility for rural businesses may be an issue secondary to overall lack of enterprise due to low propensity for growth and diversification. According to our results, availability of in-home Internet access does promote entrepreneurial intentions among rural residents, which remains the most robust predictor of entrepreneurial activities. Still, it appears that in order to make a successful transition from entrepreneurial intentions to realized entrepreneurial actions, rural residents might need additional help to overcome various barriers to action (Krueger, 2008).

For example, we found that rural residents with children are more likely to consider starting a new business in the post-Internet environment than they were in the pre-Internet environment. It might be due to a combination of two factors. First, married females with children might be more likely to consider running their own (online) business from the comfort of their home, because it still gives them an opportunity to be "a full time stay-at-home mom". Second, the heads of household (either males or females), who traditionally prefer activities with fewer risks (Unger and Crawford, 1992), may perceive businesses that rely heavily on the Internet (e.g., online sales, consulting) as less risky because they could gradually transition into these activities from more traditional employment and opt out if the start-ups were unsuccessful.

We believe that married rural residents with children could benefit from the various online educational programs, since such programs can be completed in the comfort of their homes and with a flexible scheduling arrangement. Furthermore, the educational programs that target married rural residents with children might also consider focusing on how to start, run, and promote various online businesses, since this demographic group might be more interested in e-commerce. Finally, supporting home based e-businesses that are operated by married rural residents with children (e.g., introducing tax-breaks, subsidized loans, tuition assistance) is likely to be a public policy issue because these businesses are likely to increase families' consumer power, which consequently might promote other rural enterprises.

On the other hand, our results imply that low-income, older rural residents with no college education are less likely to form entrepreneurial intentions in the post-Internet environment than they were in the pre-Internet environment. According to Jensen and McLaughlin (1997), older rural residents with no college education also have lower chances to find a regular employment in rural communities compared to younger and more educated individuals. While traditionally relying on self-employment in the post-Internet environment such individuals might perceive themselves as less competitive not only as regular employees, but also as independent entrepreneurs.

Low income was repeatedly reported as the strongest "push effect" of entrepreneurship. However, in the post-Internet environment it might be counteracted by inability of low-income rural residents to get online. Since this demographic group might not be able to become familiar enough with the Internet to successfully compete with younger, more educated individuals, we suggest the policy makers consider not only promoting various computer education programs for low-income, low-education older rural residents, but also providing in-kind support in the form of subsidized technical support and informational seminars.

Overall, our results indicate that accessibility of the Internet in rural areas leads to higher rate of entrepreneurial intentions among rural residents (even though not uniformly for all demographic groups). However, rural residents are likely to need additional support from policy-makers and extension specialists in order to overcome various barriers (e.g., insufficient resources, social norms, lack of information and/or expert advice, etc.) to make a successful transition from the entrepreneurial intentions to entrepreneurial actions.

Limitations of the analysis

The structural equation model in this study is based on the assumption that availability of the Internet positively affects entrepreneurial intentions. Clearly, this assumption could be supported more strongly if the data were collected longitudinally, and the same respondents were

asked first about availability of Internet access and then about their entrepreneurial intentions at some later point in time. We did attempt to time-order information about availability of the Internet access and information about entrepreneurial intentions by asking the participants about the two-year *history* of Internet availability and use and *current* entrepreneurial intentions. However, our results need to be treated with caution, and interpreted more as likely tendencies rather than established trends. A second wave of the survey of the Kentucky rural residents is planned for 2010, and the results of this study will be validated by the panel data.

The second limitation of our study may be linked to a relatively low response rate (approximately 14%). As discussed earlier, the response rate itself is not that surprising given that the target population were Kentucky rural residents who in general might be less unwilling to participate in surveys. Our analysis detected several response biases (education, married, race). However, according to our further analyses, these biases don't seem to affect our main results (see section 3.4).

Finally, our survey targeted households, not individuals, and females were underrepresented in our sample. Therefore, our data cannot inform how Internet penetration into rural communities affects entrepreneurial intentions and actions of females. Further studies may focus particularly on the effect of the Internet on female-run home-based businesses and on factors that affect the success rate among such businesses.

References

1. Annie's Project. http://www.extension.iastate.edu/Annie/.
2. Arbuckle, Jesse L., and Werner Wothke (1999). *AMOS 4.0 user's guide*. Chicago: SPSS.
3. Audretsch, David (2007a). "Entrepreneurship Capital and Economic Growth". *Oxford Review Economic Policy* 23: 63-78.
4. Audretsch, David (2007b). *The Entrepreneurial Society*, Oxford: Oxford University Press.
5. Aldrich, Howard, and Roger Waldinger (1990). "Ethnicity and Entrepreneurship", *Annual Review of Sociology* 16: 111-135.
6. Bimber, Bruce (2000). "Measuring the Gender Gap on the Internet". *Social Science Quarterly* 81(3): 868-876.
7. Briton, Mary (1988). "The social-institutional bases of gender stratification: Japan as an illustrative case". *American Journal of Sociology*, 94: 300-334.
8. Brush, Candida, Amanda Elam, and Elaine Allen (2008). "Fueling Economic Development through Entrepreneurship". *Babson Entrepreneurship Monitor For the Commonwealth of Massachusetts*, Briefing.
9. Charles, Maria, Marlis Buchmann, Susan Halebsky, Jwanne M. Powers, and Marisa. M. Smith (2001). "The context of women's market careers: a cross-national study". *Work and occupations* 28 (3): 371-396.
10. Chaudhuri, Anindya, Kenneth Flamm, and John Horrigan (2004). "An Analysis of the Determinants of Internet Access". Paper presented at the Telecommunications Policy Research Conference, Washington, D.C., October 1-3.
11. Choudrie, Jyoti, and Yogesh K. Dwivedi (2006). "A comparative study to examine the socio-economic characteristics of broadband adopters and non-adopters". *Electronic Government, an International Journal* 3(3): 272 - 288.
12. Clissold, Gemma. 2004. "Understanding safety performance using safety climate and psychological climate", Working paper 65/04, Department of Management, Monash University, Australia.
13. ConnectKentucky. http://connectkentucky.org/
14. ConnectKentucky Technology Trends. http://www.connectkentucky.org/_documents/2007KentuckyTechnology-Trends_residential_6-11-08.pdf
15. Crandall, Robert, William Lehr, and Robert Litan (2007). "The Effects of Broadband Deployment on Output and Employment: A Cross-Sectional Analysis of U.S. Data". *Issues in Economic Policy* 6: 1-35.
16. Cromie, Stanley, and John Hayes (1991). "The pre-entrepreneurial careers of aspiring business proprietors". In R. Donckels aand A. Meittesum, (eds) *New Entrepreneurship: Findngs and Perspective*s, Gower.
17. Cumming, Douglas, and Sofia A. Johan (2009). "The Differential Impact of the Internet on Spurring Regional Entrepreneurship", forthcoming in *Entrepreneurship Theory and Practice*.
18. Dickson, Pat H., George T. Solomon, and K. Mark Weaver (2008). "Entrepreneurial selection and success: does education matter?" *Journal of Small Business and Enterprise Development 15*(2): 239 - 258.
19. Davies, Stephen W. (1979). "Inter-firm Diffusion of Process Innovation". *European Economic Review* 12: 299-317.
20. Dwivedi, Yogush. K., and Banita Lal (2007). "Socio-economic determinants of broadband adoption". *Industrial Management and Data Systems* 107(5): 654 - 671.
21. Galloway, Laura (2007). "Can broadband access rescue the rural economy?" *Journal of Small Business and Enterprise Development 14*(4): 641 - 653.
22. Gartner, William B., Kelly G. Shaver, Nancy M. Carter, and Paul D. Reynolds (2004). *Handbook of entrepreneurial dynamics: The process of business creation.* Thousand Oakes, CA: Sage Publications.
23. Harris, John R., and Michal P. Todaro (1970). "Migration, Unemployment, and Development: A Two-Sector Analysis". *The American Economic Review* 60(1): 126-142.
24. Innovation and Information Consultants. http://www.iic-inc.com/home.php
25. Leif Jensen, and Diane K. McLaughlin (1997). "The Escape From Poverty Among Rural and Urban Elders". *The*

Gerontologist 37(4): 462-468.
26. Jöreskog, Karl G., and Dag Sörbom (1984). "*LISREL VI User's Guide*". Scientific Software, Mooresville, IN.
27. Jorgenson, Dale W. (2001). "Information Technology and the U.S. Economy", *American Economic Review* 91(1): 1-32.
28. Krueger, Norris (2000). "The cognitive infrastructure of opportunity emergence". *Entrepreneurship Theory and* Practice 24(3): 5-23.
29. Lauxen-Ulbrich, Maria, and René. Leicht (2002). "Branchenorientierung und Tätigkeitsprofile selbständiger Frauen,m Paper (2) Institut für Mittelstandsforschung.
30. Leamer, Edward E., and Michal Storper (2001). "The economic geography of the Internet age". *Journal of International Business Studies* 32: 641-665.
31. Lehr, William, Marvin Sirbu and Sharon Gillett (2006). "Wireless is Changing the Policy Calculus for Municipal Broadband". *Government Information Quarterly* 23: 435-453.
32. Lehr, William, Marvin Sirbu and Sharon Gillett (2004). "Municipal Wireless Broadband Policy and Business Implications of Emerging Technologies". Paper presented at Competition in Networking: Wireless and Wireline, London Business School, April 13-14.
33. Leigh, Andrew, and Robert D. Atkinson (2001). "Clear Thinking on the Digital Divide". http://ksghome.harvard.edu/~.leighan.students.ksg/Subpages/pdfs/Digital%20divide%20report%20PPI.pdf
34. Lewis, W. Arthur (1954). "Economic Development with Unlimited Supplies of Labor", The Manchester School, XXII: I39-9I.
35. Lumpkin, G. Tom, and Gregory D. Dess (2004). "E-business strategies and Internet business models: how the Internet adds value". *Organizational Dynamics 33* (2): 161-73.
36. Mahler, Alwin, and Everett M. Rogers (2000). "The diffusion of interactive telecommunication innovations and the critical mass: the adoption of telecommunication services by German banks". *Telecommunications Policy* 23: 719-740.
37. Minority Entrepreneurship Program. http://www.kauffman.org/entrepreneurship/minority-entrepreneurship.aspx?-ekmensel=e4e07dfa_10_0_3530_2.
38. National Telecommunications and Information Administration (NTIA, 1995, 1998, 1999, 2000) http://www.ntia.doc.gov/
39. OECD Employment Outlook: June 2001, Paris: OECD.
40. Petrin, Tea (1994). *"Entrepreneurship as an economic force in rural development."* Keynote paper presented at the Seventh FAO/REU International Rural Development Summer School, Herrsching, Germany, September 8 - 14.
41. Reynolds, Paul D (1997). "Who starts new firms? – Linear additive versus interaction based models". *Small Business Economics* 9: 449-462.
42. RUPRI State Demographic and State Profiles, 2007. http://www.rupri.org/Forms/Kentucky2.pdf
43. Schjoedt, Leon, and Kelly G. Shaver (2004). "Does the potential for increased work and life satisfaction affect the decision to pursue an entrepreneurial career? An examination of the PSED data". *First Annual Clemson/Kauffman Symposium on the PSED*. Clemson, SC.
44. Scorsone, Eric (2003). "Encouraging Entrepreneurship in Rural Communities: The University of Kentucky Entrepreneurship Initiative Program". *Journal of Extension*, 41 (6). http://www.joe.org/joe/2003december/iw5.shtml
45. Shideler, David, Narine Badasyan, and Laura Taylor (2007). "The Economic Impact of Broadband Deployment in Kentucky". *Regional Economic Development,* November: 88-118.
46. Shepherd, Dean, and Norris Krueger (2002). Cognition, entrepreneurship and teams: An intentions based perspective. *Entrepreneurship Theory and Practice* 27(2): 167-185.
47. Small Business Development Centers. http://www.sba.gov/aboutsba/sbaprograms/sbdc/index.html
48. Sobel, Michael E. (1982). Asymptotic confidence intervals for indirect effects in structural equations models. In S. Leinhart (Ed.), *Sociological methodology* (pp. 290-312). San Francisco: Jossey-Bass.
49. Stenberg, Peter, and Mitch Morehart (2006). "Determinants of Internet Use for Rural and Farm Economic Sectors". Economic Research Service, USDA. http://web.si.umich.edu/tprc/papers/2006/649/Stenberg%20TPRC2006%20v2.pdf
50. The Tennessee Broadband Task Force, 2007, Issue date: 1/23/07 Section: Technology, http://media.www.utmpacer.com
51. U.S. Bureau of Labor Statistics. http://www.bls.gov/.
52. Unger, Rhoda K. and Mary Crawford. *Women and gender: A feminist Psychology.* New York: McGraw-Hill. 1992.
53. USDA Rural Development program. http://www.rurdev.usda.gov/rd/bbbrochure.pdf
54. Varian, Hal, Robert Litan, Andrew Elder, Jay Shutter (2002). "The net impact study: the projected economic benefits of the in the United States, United Kingdom, France and Germany". http:// www.netimpactstudy.com
55. Verheul, Ingrid, Sander Wennekers, David Audretsch, and Roy Thurik (2002). "An eclectic theory of entrepreneurship". in D.B. Audretsch, A.R. Thurik, I. Verheul and A.R.M. Wennekers (eds.) *Entrepreneurship: Determinants and Policy in a European-US* Comparison, Boston/Dordrecht: Kluwer Academic Publisher.