

The Determinants of Changes in U.S. Self-Employment, 1968–1987*

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I. Introduction

The rate of self-employment increased dramatically between the mid-1970s and the early 1980s following a secular decline that dates back to at least the late 1940s.¹ The increase was concentrated among whites, was especially pronounced for women, and was more rapid for the incorporated than for the unincorporated. The reversal of the secular decline in self-employment came during a period of unusual flux in the economy. The decline in manufacturing, the expansion of the service sector, the aging of the baby-boom generation, rising educational levels, sharply rising tax rates, and increased labor-force participation by women each contributed to the increase in self-employment.

The extent to which aggregate trends in self-employment have been associated with other changes in the economy and the population is explored in this paper. We focus on white men and women who account for most of the increase in the aggregate rate of self-employment during 1968–1987.² Using the Annual Demographic File from the March Current Population Surveys, we calculated summary statistics on key labor-market variables for a number of age, race, and sex categories for each year. We then matched these statistics over time for each age, race, and sex category. This longitudinal dataset provides a detailed portrait of self-employment over time among major demographic groups. See Appendix A for details.

A simple regression framework for assessing the effect of changes in the demographic makeup of the economy, the composition of aggregate demand, and other economic factors on the self-employment rate is presented. This framework is used to examine the determinants of changes in the self-employment rate for white men in the third section and for white women in the fourth section. The last section presents a summary of the results.

II. Empirical framework

Some possible determinants of the self-employment rate

We assume that the self-employment rate depends upon four sets of factors.³

(1) Time in the labor force. The period of time over which individuals have been able to discover self-employment opportunities increases with experience. Older people have had a longer period of time to make the switch into self-employment and are therefore more likely to be self-employed. Veterans are less likely to be self-employed because they have had fewer years during which they could have switched, other things equal. To the extent that individuals discover self-employment opportunities through their participation in the labor market, women who have had lower rates of labor-force participation than men are less likely to be self-employed. Moreover, women who have fewer kids, who belong to cohorts in which labor-force participation is higher, and who are better educated are likely to have greater labor-force experience, all else equal, and are therefore more likely to be self-employed.

(2) Educational attainment. People with graduate educations are more likely to be self-employed because they are more likely to have

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selected themselves into occupations in which self-employment is more common. For women, education is a strong proxy for labor-force participation. Women who have invested more in education are more likely to have higher rates of labor-force participation over the lifecycle.

(3) Industry demand. Self-employment is more common in labor-intensive industries such as services, retail trade, and construction than in capital-intensive industries such as manufacturing and mining. We would expect that increases in the importance of self-employment intensive industries over time would increase self-employment for two reasons. First, people are more likely to start businesses in industries where they were wage workers than in other industries. Second, increases in demand for self-employment intensive industries may increase the availability of business opportunities.⁴

(4) Economic policy variables. Taxes are an important consideration in choosing between self-employment and wage work. It is easier for self-employed workers to avoid taxes (e.g. by overstating business expenses or underreporting earnings) than for wage workers. Higher average tax rates increase the gains from tax-avoidance and therefore increase the returns to self-employment.⁵ On the other hand, FICA taxes are 50 percent higher for unincorporated self-employed workers than for wage workers and 100 percent higher for incorporated self-employed workers than for wage workers.⁶ Interest rates are another important factor. Higher interest rates increase the cost of financing a business.⁷ Finally, expansions in the economy could either increase or decrease self-employment. Expansions in the economy may increase the number of self-employment opportunities. On the other hand, expansions may bid up the real wage rate and thereby reduce the relative returns to self-employment.⁸

The aging of the baby-boom generation: An illustration

Before investigating the effects of all of these factors on self-employment, it is instructive to focus on just one of these changes — the aging of the baby-boom generation — on the self-employment rate of white men. The average age of full-

time white male workers decreased from 39.66 in 1967 to 38.40 in 1975 to 37.51 in 1985.⁹

The percent of full-time white male workers who were over forty — and thus in the age group with the highest self-employment rate — decreased from 48.23 in 1967 to 43.13 in 1975 to 36.99 in 1985. Since the self-employment rate increases with age until reaching a plateau at age 40 we would expect that these changes in the age distribution of the workforce would, all else the same, decrease the self-employment rate.

We can assess the importance of the changing age distribution on the self-employment rate by calculating how the self-employment rate would have changed over time if the self-employment rate for each age level had remained the same over time and the shifting age distribution were the only change occurring. Let W_i be the fraction of the population in the i th age group and let s_i be the rate of self-employment for the i th age group. Then the fraction of the population that is self-employed is

$$s = \sum_i W_i s_i$$

Using the average value of s_i for 1967–1970 and the W_i for 1975 and 1985, we find that changes in the age distribution alone would have decreased the aggregate rate of self-employment from 8.23 in 1967 to 7.82 in 1975 and to 7.72 in 1985. Thus, had the self-employment rate for each age level remained the same, the decreasing fraction of older workers would have led to a 6.2 percent¹⁰ decrease in the average rate of unincorporated self-employment between 1967 and 1985.

In fact, the rate of unincorporated self-employment among white men did fall from an average of 8.20 in 1967 to 7.64 in 1975. The declining age of the population could account for about 70 percent this decrease. However, the rate of unincorporated self-employment among white men increased from an average of 7.64 percent in 1975 to a peak of 8.63 in 1983 before falling back to 7.70 in 1985. The many other changes that were taking place over this time period apparently offset the effects of the declining age of the population. Of course, as the baby-boomers pass through middle age over the next twenty years we would expect that self-employment will increase if this were the only change taking place.

Statistical framework

In order to assess the effect of each of the many economic and demographic changes occurring over the 1970s and early 1980s on the self-employment rate, we use a modified version of logit analysis.¹¹ The logit of the self-employment rate — s_{it} for the i th age level and the t th year — is given by

$$L_{it} = \log \frac{s_{it}}{1 - s_{it}}$$

We assume that L_{it} is given by a linear sum of variables that measure the determinants of the self-employment rate and an error term

$$L_{it} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + \varepsilon_{it}$$

where the β 's are coefficients, the X 's are variables, and ε is an error term.¹² We estimated the β 's using weighted-least squares. This technique gives less weight to age-year observations which are based on fewer individual observations and are therefore presumably less reliable.¹³

Measurement of variables

We estimated the logit model with quasi-panel data constructed from the Current Population Survey. For white men we calculated the average value of various labor-market characteristics for each age level between 18 and 60 for each year between 1967 and 1985.¹⁴ The resulting dataset has 798 observations (19 years times 42 ages). For white women we calculated the average value of various labor-market characteristics for eight five-year age intervals between 21 and 60 for each year between 1967 and 1985.¹⁵ This dataset has 152 observations (19 years times 8 age categories). We also calculated the value of proxies for some of the macroeconomic factors discussed above for each year. The value of these proxies is the same for all age-cohorts in the same year. We estimated the logit model separately for white men and women and for unincorporated and incorporated self-employment. Because data on incorporated self-employment were not available prior to 1975, the logit model for incorporated self-employment is estimated for 1975–1985, giving 462 age-year observations for men and 88 age category-year

observations for women. The remainder of this section discusses the independent variables used in the analysis.

Experience — The relationship between self-employment and age is captured by including age, squared age, and cubed age in the regression for men and dummy variables for each of the 8 age categories for women.¹⁶ The effect of military service is measured by the proportion of the age cohort that has been in the armed forces.¹⁷ For women, we used historical data on the labor-force participation rate by age cohorts as a proxy for female work experience. But we found that this variable had little explanatory power once we controlled for education and subsequently excluded it from the model. We also tried average number of children born to women as a proxy for experience. But we found that this variable, too, had little effect on the self-employment rate.

Education — We measured education by including the proportion of each age cohort which had attained the following educational levels: less than high-school, high-school, less than college, college, and graduate school. Because these proportions sum to one we excluded the high-school category. Consequently, the coefficients on the educational proportions measure the effect of education relative to individuals who have a high-school education.

Industries — We used the proportion of individuals in each cohort in each of 14 industries: agriculture, mining, construction, durable manufacturing, transportation, wholesale trade, retail trade, finance, business and repair service, personal services, professional services, entertainment, and government. We excluded the proportion for durable manufacturing to preclude perfect collinearity. Thus, the estimated coefficients on the industry proportions measure the effect of the industry proportion relative to durable manufacturing.

Macroeconomic Effects — The federal tax rate and FICA tax rate were measured by indices of the income tax and FICA burden constructed by Gillingham and Greenlees (1987). These indices were then deflated by the consumer price index to yield an index of real average taxes paid by individuals.¹⁸ Business-cycle effects were captured by including the growth rate of real gross national product over the year.¹⁹ The interest rate was

measured by the interest rate for commercial and industrial loans effective at banks.²⁰

In the next two sections we report the estimated percent change in the self-employment rate due to a percent change in each of the factors we have considered and we examine the ability of the estimated model to explain secular changes in self-employment.²¹ The detailed results are reported in Evans and Leighton (1987).

III. White male self-employment over time

Table I summarizes the results for white men. The explanatory power of the regressions is quite good. The R^2 's indicate that the model explains almost 90 percent of the variation in self-employment over time and across age groups. There are several important similarities and differences between the results for the unincorporated and the incorporated.

Experience. Age, as we have already seen, is a strong determinant of the self-employment rate. A 10 percent increase in age leads to a 17.75 percent increase in the unincorporated self-employment rate and a 24.07 percent increase in the incorporated self-employment rate. Veterans, as we conjectured, are slightly less likely to be self-employed. A 10 percent increase in the proportion of an age group that has been in the armed forces reduces the unincorporated self-employment rate by 0.63 percent and the incorporated self-employment rate by 0.58 percent.

Education. The frequency of self-employment increases with the amount of education for the incorporated self-employed. Those with a graduate school education are most likely to form incorporated businesses. A 10 percent increase in the proportion of an age group with a graduate education leads to a 2.23 percent increase in the incorporated self-employment rate. The relationship between self-employment and education is more complicated for the unincorporated self-employed. The estimated coefficients imply the following ranking of education and the self-employment rate (strongest to weakest): high-school dropout, college dropout, college graduate, graduate, and high-school.

Industries. As conjectured, the self-employment rate is higher for the service industries, construction, and trade, and lower for durable and non-

TABLE I
Estimated percent change in the self-employment rate of white males due to a 10% change in economic and demographic factors^a

Due to a 10 percent change in	Percent change in unincorporated self-employment	Percent change in incorporated self-employment
Age	17.75*	24.07*
High-school dropouts	1.29*	-0.54
College dropouts	1.17*	0.57
College graduates	1.06*	1.23*
Graduate school	0.51	2.23*
Veterans	-0.63*	-0.58
Urban residents	-0.86	-1.91
Federal tax index	2.93*	4.44
FICA tax index	-1.65*	1.32
Real GNP change	0.16*	0.03
Interest rate	-0.19	-0.15
Agriculture	0.42*	-0.23
Mining	0.18	0.00
Construction	1.70*	2.52*
Nondurable manufacturing	-0.30	-0.09
Transportation	-0.27	0.22
Wholesale trade	0.66	0.60
Retail trade	2.29*	1.57
Finance	0.24	0.71
Business and repair service	0.42	1.16*
Personal service	0.35*	0.30
Entertainment	0.21	0.22
Professional services	1.51*	0.43
Public administration	-0.35	-0.00
Adjusted R^2	0.87	0.88
F-statistic	208.56	114.39
Observations	788	442

^a Weighted-average elasticities across sample using population weights.

* Statistically significant at the five percent level.

durable manufacturing. For the unincorporated self-employed, increases in the proportion of the workforce in construction, retail trade, and professional services lead to the largest proportionate increases in the self-employment rate. For the incorporated self-employed, increases in the proportion of the workforce in construction, trade, and business and repair services lead to the largest proportionate increases in the self-employment rate.

Economic-policy variables. As suggested by Long (1982), increases in the federal tax rate are associated with higher self-employment. A 10

percent increase in the federal tax index leads to a 2.93 percent increase in the unincorporated self-employment rate and a 4.44 percent increase in the incorporated self-employment rate. Increases in FICA taxes appear to decrease the unincorporated self-employment rate — a 10 percent increase in the FICA index leads to an estimated 1.65 percent decrease in the self-employment rate — but to increase the incorporated self-employment rate — a 10 percent increase in FICA leads to a statistically insignificant 1.32 percent increase in self-employment. The higher FICA rate for sole proprietors relative to wage workers apparently decreases self-employment earnings relatively more than wage earnings. Finally, self-employment increases with increases in the growth of real GNP and decreases with the market interest rates. These effects are quite small, however, and are statistically significant only for the GNP variable for the unincorporated.

How well do these factors explain changes in the self-employment rate over time? To answer this question we calculated the estimated self-employment rate from the model and compared it with the actual self-employment rate.²³ The absolute value of the percent deviation from the actual and the estimated rate was 12.69 percent for the unincorporated self-employed and 17.08 percent for the incorporated self-employed. There was no evidence that the model systematically underestimated or overestimated the self-employment rate over the time period. The estimated model does fairly well in tracking the aggregate level of self-employment.

IV. White female self-employment over time

The percentage of full-time working women who were self-employed in either incorporated or unincorporated businesses increased by 1.40 percentage points from 3.62 percent in 1975 to 5.02 percent in 1985. The absolute rise in the self-employment rate for women was almost the same as for men for whom the self-employment rate rose by 1.23 percentage points from 10.75 percent in 1975 to 11.98 percent in 1985. But the relative increase was much greater. The female self-employment rate increased by more than a third while the male self-employment rate increased by a little more than a tenth.

The increase for women came about equally from increases in incorporated self-employment which rose by 0.62 percentage points (from 0.59 to 1.21 percent) and from unincorporated self-employment which rose by 0.85 percentage points (from 2.96 to 3.81 percent) between 1975 and 1985.²⁴ The rate of incorporated self-employment for women almost doubled over these eleven years while the rate of unincorporated self-employment rose by slightly more than a fifth. The rates of incorporated and unincorporated self-employment have increased for almost every age level over time.²⁵

We explore the sources of these changes in this section. In addition to the factors discussed earlier we discuss an additional explanation for increasing self-employment for women which has been suggested by many popular commentators. Women may be able to juggle family and career more easily when they work for themselves than when they have a wage job. This statement may be especially true for women with small children and women who have made substantial investments in their careers (e.g. by going to college or graduate school). To test this hypothesis we have included the fraction of each age group with children under the age of 3 and the interaction between this fraction and the fraction with a graduate education.

Table II summarizes the regression results. The explanatory power of the regressions are quite good: 91 percent of the variation in unincorporated self-employment and 86 percent of the variation in incorporated self-employment across ages and over time is explained by the model. However, the precision of the estimates — as reflected by the standard errors of the estimates reported in the appendix — is somewhat lower than those obtained for men.

Several results are apparent from the estimates.²⁶ One of the most important determinants of female self-employment is the percent of women with some graduate education. A ten percent increase in the proportion of women who have done some graduate work leads to a 3.56 percent increase in unincorporated female self-employment and a 4.79 percent increase in incorporated self-employment. More generally, the results show that the frequency unincorporated and incorporated self-employment increases with education for women.

TABLE II
Percent change in the self-employment rate for white women
due to a 10% change in economic and demographic factors^{a, b}

Due to a 10 percent change in	Percent change in unincorporated self-employment	Percent change in incorporated self-employment ^c
High-school dropouts	-1.69	9.99*
College dropouts	0.73	-16.79*
College graduates	-0.24	-12.1*
Graduate school	3.56*	4.79*
Federal tax index	3.67	7.47
FICA tax index	-3.49	7.39
Real GNP change	0.07	0.75*
Interest rate	0.02	0.09
Kids 3 and under	—	6.45*
Agriculture	1.14*	—
Mining	-0.17	—
Construction	1.41*	—
Nondurable manufacturing	1.49	—
Transportation	0.17	—
Wholesale trade	1.08	—
Retail trade	5.46*	—
Finance	3.23	—
Business and repair service	1.23	—
Personal service	3.17*	—
Entertainment	0.60	—
Professional services	1.83	—
Public administration	1.54	—
<i>R</i> ²	0.91	0.86
<i>F</i> -statistic	60.62	28.91
Observations	152	88

^a Weighted-average elasticities across sample using population weights.

^b Age dummies for 9 age categories also included in regression.

^c Industry proportions were jointly insignificant and therefore excluded.

* Statistically significant at the five percent level.

Changes in industry demand are an important determinant of unincorporated but not incorporated female self-employment. The industry effects were jointly insignificant for the incorporated and were excluded in the final results.²⁷ Unincorporated female self-employment increases with the proportion of women who are in retail trade, personal services, construction, and agriculture.

The macroeconomic effects are broadly consistent with those found for men. Both incorporated and unincorporated self-employment

increase with federal income taxes but unincorporated self-employment increases with FICA while incorporated self-employment decreases with FICA. Self-employment increases with increases in real GNP, although not strongly. Interest rates have a negligible effect on self-employment.

Finally, we found that the presence of children under the age of 3 among women with some graduate education was an important determinant of incorporated but not unincorporated female self-employment. Among women with some graduate work a 10 percent increase in the proportion with children under the age of 3 is associated with 6.45 percent increase in the rate of incorporated self-employment. This finding, of course, is consistent with the view that self-employment allows women to better handle family responsibilities and their careers.

The model tracks female self-employment fairly well. The average absolute value of the percent deviation between the actual and predicted self-employment rate was 10.89 percent for the unincorporated and 19.98 percent for the incorporated. As for the men, the model tracks secular changes in self-employment fairly well.

V. Summary

The self-employment rate depends on the distribution of full-time workers across ages, educational levels, and industries and on tax rates and business conditions. About 90 percent of the variation in self-employment across time and across age groups is explained by these factors. Swings in the self-employment rate over time result from the interplay of changes in these factors. The entry of the baby-boom generation into the labor-force beginning in the later 1960s has led to a decrease in the average age of the full-time nonagricultural workforce and has tended to decrease the self-employment rate. The secular decline of manufacturing, the secular rise of services, and secular increases in educational levels have tended to increase the self-employment rate. Fluctuations in business conditions and tax rates have also affected the self-employment rate. The evidence reported here suggests that self-employment is procyclical, although not strongly so. Increases in effective federal income

during the late 1970s tended to increase self-employment rates while decreases during the Reagan years tended to decrease self-employment rates.

These findings are helpful for speculating about the answers to three important questions. First, are people more entrepreneurial than they used to be? The fact that the ebb and flow of self-employment over time can be explained almost entirely by structural changes in the economy suggests that people with given demographic characteristics and working in particular industries have not become more likely to try entrepreneurship.²⁸

Second, did the supply of entrepreneurs increase during the Reagan years? The answer is yes and no.²⁹ The number of people who operate full-time businesses has certainly increased: from 5.99 million in 1981 to 6.46 million in 1985. The *absolute* supply of entrepreneurs has risen. But the number of people who are full-time wage workers has also increased: from 65.2 million in 1981 to 71.6 million in 1985. The fraction of workers who operate businesses has fallen: it increased from 9.3 percent in 1981 to a peak of 10.0 percent in 1983 and then fell to 9.1 percent in 1985. The *relative* supply of entrepreneurs has thus fallen. Ironically, one of the many causes for the decline in the relative supply of entrepreneurs was the decrease in tax rates that were, according to supply-side advocates, supposed to have increased entrepreneurship.³⁰

Third, will we see rising or falling self-employment in the coming decade? Predicting future rates of self-employment is treacherous because these rates depend upon many factors. The aging of the baby-boom generation will by itself lead to sharply increasing rates of self-employment as the baby-boomers, who started turning 40 in 1985, pass through the peak years of self-employment. This upward trend may be offset by a number of more fragile structural changes in the economy. The sharp decline of the dollar may reinvigorate manufacturing at the expense of services. If so, self-employment will decline. Further lowering of federal income tax rates may reduce the gains from tax-avoidance through self-employment and thereby impart a further downward trend in self-employment rates. Other changes that have helped increase self-employment may have run their course. Female labor-force participation rates and

educational levels among both men and women may have reached a plateau. If so, these factors will cease to be a factor in changing self-employment rates.

This paper has analyzed the determinants of changes in the aggregate rate of self-employment across age cohorts. When examining aggregate rates of self-employment we have ignored more subtle questions concerning why particular individuals choose to try self-employment at particular times in their careers and what makes a successful entrepreneur. These questions await future research.

Appendix A: The longitudinal CPS dataset

The dataset we created describes full-time non-agricultural workers. A worker is considered full time if he or she worked at least 40 weeks in the preceding year and usually worked at least 35 hours per week.³¹ The dataset begins in 1968, which is the first year for which computerized CPS data are available, and ends in 1986, the last year for which data were available. Over this period CPS surveyed 832 768 full-time nonagricultural workers. We used the CPS data for March of each year. The labor-market information (including whether the person is self-employed) is based on the longest-held job in the preceding calendar year. Thus the 1968–1986 CPS data provide labor-market information for 1967–1985. Reported dates refer to the year to which the labor-market information applies rather than the year in which individuals were surveyed.

We grouped workers into 11 age categories (18–20, 21–25, 26–30, . . . , 71–75), three race categories (whites, blacks, others), and two sexes. We chose these categories to maximize the number of observations available for analysis subject to maintaining reasonable sample sizes in each of the cells. We used population weights provided by Census to calculate summary statistics for each cell.

We concentrate on individuals who were between 21 and 60 in the survey year. Self-employment increases dramatically after age 60 because of retirement effects that we did not wish to treat at this stage of our research. We therefore excluded workers over 60. Self-employment is infrequent for 18–20 year-old workers. There were a

large number of demographic groups for which none of the 18–20 year-old workers were self-employed. In order to minimize the number of empty cells we eliminated the very young workers. After these deletions the 1967–1985 sample consisted of 756 929 individuals who were sorted into 912 race-sex-age-year categories.

The average number of individuals per category was 830. Because some of the categories (the other-race categories in particular) contain few observations, we pool categories together in order to increase the number of observations (and therefore the reliability of the results) used for some of the analyses.

Between 1967 and 1974, Census included individuals who own and operate an incorporated business among wage and salary workers. Beginning in 1975, Census reported whether individuals worked for an unincorporated business or for an incorporated business. We can therefore track unincorporated self-employed workers from 1967–1985, incorporated self-employed workers from 1975–1985, and all self-employed workers from 1975–1985.

Notes

* We would like to thank Jules Lichtenstein and Edward Starr for helpful comments and suggestions.

¹ See Blau (1987) for a discussion of secular trends in self-employment.

² See Evans and Leighton (1987) for a comparison of self-employment across demographic groups.

³ See Evans and Leighton (1987) for a behavioral model which suggests the importance of these factors.

⁴ Although increases in demand will also increase the demand for labor and thereby increase the opportunity cost of starting a business.

⁵ See Long (1982) for a discussion and evidence that individuals with a higher expected tax liability in wage work are more likely to be self-employed.

⁶ The incidence of FICA taxes is a complicated question however. It depends upon the ability of firms to pass FICA taxes on to workers in the form of lower wages and to customers in the form of higher prices. It also depends upon the ability of self-employed people to understate income or overstate expenses since FICA taxes like income taxes are a percent of net income.

⁷ Note that higher interest rates increase the cost of using personal funds to finance a business since the individual sacrifices the interest he could have otherwise earned on these funds.

⁸ See Becker (1984) for some evidence that self-employment is countercyclical.

⁹ We have excluded workers over 60 and workers in agricultural industries.

$$^{10} \quad 100 \frac{8.23 - 7.72}{8.23} = 6.2 \text{ percent}$$

¹¹ See the note below and Judge and Lee (1983) for further discussion.

¹² The logit model assumes that the self-employment rate is given by

$$\frac{1}{1 + \exp(-\beta x + \epsilon)}$$

where β is a vector of coefficients, x is a vector of variables, and ϵ is an error term. The transformation described in the text converts this relationship to a linear regression equation. See any basic statistics textbook.

¹³ A technical note is in order here on the precise details of our estimation approach. The error term reflects two sources of error. First, it reflects the fact that the rates of self-employment (s_i) are estimated from a random sample of a binomial population (see, e.g., Theil, 1971). The error generated by such sampling has zero mean and a variance of $Ns(1-s)$ where we have suppressed the subscripts. Second, it reflects the fact that we have left out many factors that affect self-employment. We assume that these other factors can be treated as a random disturbance u with zero mean and a variance that may be nonconstant across observations and over time. If the disturbance term reflected only the error from the binomial sampling, estimation would be straightforward. The probable importance of unobservables and the fact that these unobservables are possibly correlated across observations and over time raises some difficulties. Regression estimates of the variance-covariance matrix will be inconsistent under such circumstances. We face two choices in such a situation. (1) We can try to explicitly model the disturbance process. This approach is not satisfactory here because, aside from the binomial sampling, theory tells us little about the distribution of the unobservables or of the precise correlation pattern over time. (2) We can use a consistent estimate of the variance-covariance matrix following the approach suggested by White (1982) and implemented in HotzTran (Hotz and Avery, 1985). In preliminary work, we adopted this approach after weighting the data by $(Ns(1-s))^{1/2}$ to minimize the effect of the binomial sampling which is likely to be the main source of heteroskedasticity. We found that after weighting the data, the correction for heteroskedasticity was of fairly minor importance and did not affect any of the inferences. For convenience, we report results unadjusted for heteroskedasticity.

¹⁴ These summary statistics are based on an average of 586 white men for each age-year combination.

¹⁵ These summary statistics are based on an average of 1509 women for each age-interval-year combination. Women under 21 were excluded because in most years there were no self-employed women at these age levels.

¹⁶ We excluded the dummy variable for 41–45 year-old women to preclude perfect collinearity. Thus the coefficients on the age dummies measure the effect of age relative to 41–45 year-old women.

¹⁷ This variable is not available for women.

¹⁸ Marginal tax rates moved roughly in parallel.

¹⁹ Obtained from the *Economic Report of the President*, various issues.

²⁰ Obtained from the *Federal Reserve Bulletin*, various issues.

²¹ The percent change in self-employment due to a percent change in an X variable is given by $n_i = (1 - s_i)X_i\beta_i$.

²² The asterisks in the table denote variables which were statistically significant at the 5 percent level. Standard errors are reported in the statistical appendix.

²³

Note that $s = \frac{\exp L}{1 + \exp L}$ where $L = \beta X$.

²⁴ Between 1967 and 1975, however, the white female rate of unincorporated self-employment increased from 3.63 percent to only 3.81 percent. Figures for incorporated self-employment are not available for this period.

²⁵ The unincorporated rate of self-employment decreased for women over 50 while the incorporated self-employment rate decreased for women between 21 and 25.

²⁶ As for the men, self-employment is strongly dependent upon age. We measured age for the women by including dummy variables for each of the age groups. See the regression results reported in the appendix for more details.

²⁷ The other coefficients are similar, however, when the industry effects are included.

²⁸ The possibility remains, however, that people have invested in more education and have taken jobs in self-employment intensive industries in part because they hope to start small businesses. Further research will be necessary to control for this potential endogeneity problem.

²⁹ Note that the following calculations are for full-time nonagricultural workers between the ages of 21 and 60.

³⁰ Our analysis of the effects of taxes on entrepreneurship, however, are hardly comprehensive. Further work on the

effect of personal income tax rates, corporate tax rates, capital gains tax rates, changes in expensing provisions, and tax avoidance possibilities on the wage-entrepreneurship decision would be very useful.

³¹ We have also constructed datasets on part-time non-agricultural workers and white male nonagricultural workers. The white-male dataset consists of yearly age observations. Note that published Census statistics on self-employment generally include workers who are part-time by our definition and are therefore not comparable to the statistics presented in this paper.

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