POLICY RESEARCH WORKING PAPER

wps 2527

2527

Is Inequality Bad for Business?

A Nonlinear Microeconomic Model of Wealth Effects on Self-Employment

*Alice Mesnard**Martin Ravallion*

Data on occupational choice among return migrants in Tunisia reveal that higher inequality of wealth reduces the level of new business activity. The effect is not large, however. Even dramatic redistributions of wealth would not provide much stimulus to entrepreneurship.

Summary findings

It is widely assumed that pervasive credit market failures mean that a person's current wealth is critical to whether or not that person takes up opportunities to start a new business.

Mesnard and Ravallion show that inequality in wealth can be either good or bad for the level of entrepreneurship in an economy, depending on how diminishing returns to capital interact with borrowing constraints at the microeconomic level.

They use nonparametric regression methods to study wealth effects on business start-ups among migrants returning to their home country, Tunisia. They include controls for heterogeneity, with specification tests for the nonseparable effects with wealth and for selection bias.

There is no evidence of increasing returns at low wealth.

The aggregate number of business start-ups is an increasing function of aggregate wealth but a decreasing function of wealth inequality.

In other words, at any given mean, the higher the initial inequality of wealth, the lower the rate of new business start-ups, through the existence of diminishing returns to capital given liquidity constraints. In this sense, the results suggest that inequality is bad for business—but the size of this effect is small.

The findings do not constitute a case for public redistribution of wealth as a means of stimulating business activity. There should probably be more research on interventions to reduce liquidity constraints.

This paper—a product of Poverty and Human Resources, Development Research Group—is part of a larger effort in the group to understand how the distribution of wealth in an economy influences macroeconomic activity and occupational structure. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Patricia Sader, room MC3-556, telephone 202-473-3902, fax 202-522-1153, email address psader@worldbank.org. Policy Research Working Papers are also posted on the Web at www.worldbank.org/research/workingpapers. Martin Ravallion may be contacted at mravallion@worldbank.org. January 2001. (28 pages)

The Policy Research Working Paper Series disseminates the findings of work in progress to encourage the exchange of ideas about development issues. An objective of the series is to get the findings out quickly, even if the presentations are less than fully polished. The papers carry the names of the authors and should be cited accordingly. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the view of the World Bank, its Executive Directors, or the countries they represent.

Is Inequality Bad for Business?

A Nonlinear Microeconomic Model of Wealth Effects on Self-Employment

Alice Mesnard

*ARQADE, University of
Toulouse 1*

Martin Ravallion¹

*Development Research Group, World Bank
and ARQADE, University of Toulouse 1*

JEL: D31, M13

Keywords: Liquidity constraints, wealth inequality, entrepreneurship

¹ These are the views of the authors, and need not reflect those of their employers including the World Bank. For their comments on this paper the authors are grateful to Bruno Biais, Esther Duflo, Emanuela Galasso and Dominique van de Walle.

1. Introduction

It is widely assumed in economic theory and policy that pervasive credit market failures mean that a person's current wealth is critical to whether or not that person takes up opportunities to start a new business. Support for this assumption has been found in empirical evidence of significant current wealth effects on the probability of entering self-employment.²

The existence of liquidity constraints suggests that the level of aggregate wealth in an economy will matter to the number of business start-ups. But will the distribution of that wealth also matter? If in fact markets provide too little credit to support entrepreneurship, then there may be a case for interventions that target extra credit to poor potential entrepreneurs. Presumably this will be at the expense of less poor ones. The implications for the aggregate level of new business activity thus depend critically on higher moments of the distribution of wealth than its mean. It is known that the occupational structure of a credit-constrained economy (including the extent of self-employment) can depend on the initial distribution of wealth (Banerjee and Newman, 1993). There are also theories suggesting that asset inequality impedes entrepreneurship and hence aggregate investment and macroeconomic growth.³

It is far from obvious on *a priori* grounds whether inequality is good or bad for the aggregate level of business activity in an economy. The potential ambiguity in the relationship between entrepreneurship and wealth distribution can be illustrated with a simple model depicted in Figure 1 — which we derive more formally later in this paper. Liquidity constraints entail that the probability of someone starting a new business (on the vertical axis) rises with personal

² See Evans and Jovanovic (1989), Evans and Leighton (1989), Holtz-Eakin, Jouflaian and Rosen (1994), Magnac and Robin (1996), Blanchflower and Oswald (1998), Paulson and Townsend (2000).

³ Models with this feature can be found in Benabou (1996), Piketty (1997), Aghion and Bolton (1997), Aghion et al. (1999) and Banerjee and Duflo (2000).

wealth (horizontal). There is lumpiness in the capital requirements for setting up a new business. It is difficult for someone with low wealth to finance any extra capital for a new business beyond a modest personal endowment. Thus one can postulate that, at low wealth, there are increasing returns from extra wealth in terms of one's ability to borrow extra resources; at low wealth the relationship is convex. Above some point, the probability of starting a new business increases more rapidly with wealth, but with diminishing returns to capital setting in, and borrowing constraints starting to relax, such that the probability of a new start is a concave function of initial wealth above some point. Such a model yields ambiguous predictions about the effects of changes in wealth distribution on new business activity. Small mean-preserving redistributions from anyone above the point of inflexion in Figure 1 to anyone below this point could either increase or decrease the aggregate number of business starts in a fixed population. Redistributions amongst those above (below) the critical minimum will increase (decrease) the aggregate number of new starts.

What does the evidence suggest? Past micro empirical work on entrepreneurship has given little explicit attention to distributional effects, though some specifications have allowed for nonlinearities in the wealth effect on self-employment. For example, Evans and Jovanovic (1989) included both linear and squared terms in current family wealth in their regressions for the probability of entering self-employment amongst young US men. They found a negative coefficient on squared wealth though it was not significant. (The linear and squared terms were jointly significant.) There is also some empirical evidence from cross-country growth regressions suggesting that initial inequality matters to the subsequent rate of growth, though it is not clear what structural role entrepreneurship has played. Nor have the results in the literature been robust to alternative specifications, and there are a number of concerns about both the data

and methods used. For example, spurious inequality effects in an aggregate growth regression can arise from the assumptions made in aggregating across micro-relationships, given credit market failures (Ravallion, 1998). The validity of the common assumption that initial inequality has a linear effect on aggregate growth is also questionable (Banerjee and Duflo, 2000).⁴

This paper uses micro data to test whether inequality matters to the aggregate rate of new business activity. We look for nonlinear wealth effects on the transition to self-employment, consistent with the argument that the extent of aggregate business activity in an economy depends on the distribution of wealth. The paper also tries to assess how sensitive the aggregate level of new business activity is to changes in the distribution of wealth amongst potential entrepreneurs.

We try to learn more about the implications of wealth distribution for aggregate entrepreneurship by studying the empirical relationship between starting a business and the amount of accumulated savings brought back by return migrants in a developing country. Return migrants provide an interesting sample for the purpose of studying wealth effects on entrepreneurship. The problem of unexploited opportunities for taking up new business activities is often assumed to be greater in developing countries, where capital markets are thought to be less effective, though it might also be conjectured that start-up costs are lower in developing countries. One must expect heterogeneity in other factors relevant to occupational choice in a

⁴ Mention should also be made of measurement error in both the levels and changes in income inequality in cross-country data sets, including comparability problems between countries and over time arising from survey error (sampling and non-sampling) and heterogeneity in survey design and processing (see, for example, Atkinson and Brandolini, 1999). One expects that this will matter more to tests which allow for country fixed effects than standard growth regressions, since the signal-to-noise ratio could well be quite low for changes in measured inequality in existing data sets.

developing country, as elsewhere. In this respect, return migrants are likely to be a more homogeneous group than the population as a whole within a developing country.

However, the main attraction to studying return migrants is that they offer the hope of avoiding a common problem in using ordinary survey data for this purpose, namely that wealth immediately prior to the time of taking up self employment is unobserved. Wealth data are uncommon, and even when available it is obtained at the survey date, typically after the occupational choice has been made. By contrast, migrants have returned to their home country with diverse amounts of wealth, accumulated from past savings while abroad, and then face the choice of what to do. By asking how much was accumulated while abroad, and seeing which ones started up a new business on their return, we can hopefully identify the wealth effects on entrepreneurship, and test for nonlinearity.

In terms of our method of analysis, our main point of departure from the past empirical work on entrepreneurship is that we do not parameterize the relationship between start-up wealth and entrepreneurship. With liquidity constraints, there is no obvious reason why the wealth effect on occupational choice would be linear, or indeed have any specific parametric form. If there are fixed start-up costs and the liquidity constraint takes the form of a collateral requirement for borrowing then one would expect the effect to be highly nonlinear, at least amongst observationally identical workers. Only when own wealth reaches some critical level (conditional on individual characteristics) will new businesses emerge. We build this feature into a model of business start-ups, in which the curvature of the entrepreneurship-wealth relationship emerges from the balancing of opposing effects stemming from diminishing returns to capital versus borrowing constraints. Motivated by this theoretical model, we treat the wealth effect in a

flexible way, to see if it exhibits the features one would expect if distribution matters. To achieve this flexibility we employ non-parametric regression methods.

We also allow for heterogeneity in other characteristics in the form of linear controls. Thus we apply recent advances in the estimation of partial linear models (as reviewed by Yatchew, 1998). We extend this approach by also allowing for the possibility that individual characteristics influence new business starts in a non-separable way. This could happen if credit markets work better for some people than others. For example, wealth may be less of a constraint on starting a business for well-educated entrepreneurs. This calls for a new specification test for partial linear models. The inherent nonlinearity of liquidity constraints permits identification for the purpose of specification testing.

The following section discusses the relationship between business start-ups and wealth in general terms, while section 3 outlines our econometric model. Section 4 describes the data and gives some descriptive results. The estimations are presented in section 5, while section 6 examines their implications for the question in our title. Section 7 concludes.

2. Wealth effects on entrepreneurship in theory

We assume that a given amount of accumulated savings W allows one to borrow up to some amount of start-up capital K . In the Evans-Jovanovic (1989) model K is some fixed multiple of W with slope not less than unity. We allow an increasing slope arising from limitations on borrowing facing the poor, as in Figure 2. More precisely, we let K be some unknown but strictly increasing and convex function of W :

$$K_i = \phi(W_i) \text{ for } W_i \in [W^{\min}, W^{\max}] \quad (1)$$

where $\phi(W_i) > W_i, \phi' > 0, \phi'' > 0$. This assumption characterizes what one would expect to find if poor entrepreneurs have very little access to credit, but borrowing becomes progressively easier (though still credit-constrained) at higher levels of wealth.

The output from the new business is $F(K_i)$ where the function F is increasing and concave as usual. (Both the functions ϕ and F are taken to have continuous derivatives up to at least the second order.) There is some fixed own-labor requirement that is subsumed in the function F . The opportunity cost of capital is r while for own labor it is w_i which is a random variable with continuous twice differentiable distribution function Ψ . (Note that w_i could also include random differences in outputs.)

The probability of starting a new business (P_i) is then the probability that $F(\phi(W_i)) - r\phi(W_i)$ exceeds w_i , as given by:

$$P_i = \Psi[F(\phi(W_i)) - r\phi(W_i)] = f(W_i) \quad (2)$$

with slope:

$$f'(W_i) = \Psi'(\cdot)[F'(\phi(W_i)) - r]\phi'(W_i) \quad (3)$$

This vanishes in the special case in which the entrepreneur is not liquidity constrained, and so can employ as much capital as desired ($F'(K_i) = r$). In the liquidity-constrained case, however, $f'(W_i) > 0$.

The curvature of the function f is less obvious. In the special case in which the distribution of w is uniform ($\Psi'(\cdot)$ is constant) and the capital stock is directly proportional to initial wealth (as assumed in the Evans-Jovanovic model), the function f will be strictly concave, with second derivative:

$$f''(W_i) = \Psi'(\cdot) \phi'(W_i)^2 F''(K_i) < 0 \quad (4)$$

However, this is only one possibility. Allowing for a non-uniform distribution of the opportunity cost of labor, and relaxing the assumption that capital is proportional to wealth we have:

$$f''(W_i) = \Psi'(\cdot) [\phi'(W_i)^2 F''(K_i) + (F'(K_i) - r) \phi''(W_i)] + \Psi''(\cdot) (F'(K_i) - r)^2 \phi'(W_i)^2 \quad (5)$$

It is evident from (5) that the curvature of the function f is ambiguous. There is a concave effect coming from diminishing returns to capital ($\phi'(W_i)^2 F''(K_i) < 0$), a convex effect from the borrowing constraint ($(F'(K_i) - r) \phi''(W_i) > 0$) and a third term of unknown sign coming from any non-uniformity in the distribution of the opportunity cost of labor. Sufficient conditions to obtain the pattern in Figure 1 are that:

(i) $f'''(W_i) < 0$; this will hold if (for example) the functions F and ϕ are quadratic, and the distribution of labor cost is uniform,

(ii) diminishing returns to capital do not set in until wealth reaches some critical positive level, so $F''[\phi(W^{\min})] = 0$,

(iii) credit constraints cease to bind at sufficiently high wealth, implying that

$$F'[\phi''(W^{\max})] = r.$$

(iv) the distribution of the opportunity cost of labor is either uniform or unimodal with a rising density at low wealth ($\Psi''[F(\phi(W^{\min})) - r\phi(W^{\min})] > 0$) and falling at high wealth ($\Psi''[F(\phi(W^{\max})) - r\phi(W^{\max})] < 0$).

Together these conditions assure that $f''(W^{\min}) > 0$ and $f''(W^{\max}) < 0$. Thus, by continuity of $f''(W_i)$, there exists a unique point of inflection at which the relationship switches from being convex at low wealth to concave, as in Figure 1.

The aggregate number of new business start-ups is

$$P = P(W_1, W_2, \dots, W_n) = \sum_{i=1}^n f(W_i) \quad (6)$$

If the function f is strictly convex (concave) then the function P will be strictly quasi-convex (concave) in the vector of wealth endowments, $(W_1, W_2, \dots, W_n)$. If one is comparing two distributions of wealth, one of which can be obtained from the other by a mean-preserving spread, then it follows from well-known properties of concave functions that the distribution with higher inequality will generate a higher (lower) aggregate number of new business starts if the function f is convex (concave).

In this model, the effect of wealth distribution on the aggregate number of business starts is theoretically ambiguous. Inequality amongst those with wealth above the point of inflexion in Figure 1 will reduce aggregate business activity; inequality amongst those with wealth less than this value will be good for business activity. Nothing in general can be said about redistributions from those above this point to those below it. Next we outline our method for studying the issue empirically.

3. An empirical model

The discussion in the last section points to the need to represent the initial wealth effect on entrepreneurship in as flexible a way as possible, for which non-parametric regression methods are an obvious choice.

To take such a model to data we must allow for heterogeneity in other characteristics besides start-up wealth. This could arise from differences in output at a given level of capital (such as due to differences in the availability of family labor to help with the business) or differences in the opportunity cost of labor. We use linear controls, so that our method entails estimating partial linear regressions, in which the sub-function for the wealth effect is nonlinear. However, we introduce a specification test, which allows us to relax this assumption. In particular, the test allows for control variables to also enter non-separably, through the wealth effect.

Thus we write the probability of starting a business as some unknown function of W , as well as control variables X :

$$P_i = f(W_i) + X_i\pi + v_i \quad (i = 1, \dots, n) \quad (7)$$

in which the zero-mean innovation error has variance σ_v^2 . Notice that, unlike a probit or logit model, there is no guarantee that the predicted values for P will lie entirely within the (0,1) interval. We will check if our estimates satisfy this condition.

All that we assume about the function f is that it is smooth and single valued; in particular, the first derivatives of f are bounded by constants, $k \geq |\Delta f(W_i)|/|\Delta W_i|$. The function need not be monotonic, or take any parametric form.

To estimate the model of business starts in (7) we follow the literature on partial linear models. Following Robinson (1988) we order all observations in terms of their values of W_i and take differences between the data for successive ranked observations, giving the regression:

$$\Delta P_i = \Delta f(W_i) + \Delta X_i \pi + \Delta v_i \quad (8)$$

where ΔX_i is the difference between the value of X for the i 'th observation and that for $i-1$ when ranked in ascending order of W . Under our assumption about the function f , the first term on the RHS vanishes as n goes to infinity ($\text{plim}[f(W_i) - f(W_{i-1})] = 0$). So we estimate the following parametric regression by least squares:

$$\Delta P_i = \Delta X_i \pi + \Delta v_i \quad (9)$$

This gives us consistent estimates of the π parameters under standard assumptions. We can then estimate the non-parametric regression:

$$P_i - X_i \hat{\pi} = f(W_i) + v_i \quad (10)$$

Higher-order differencing achieves efficiency gains in this method (Yatchew, 1998). We write equation (9) as:

$$\sum_{j=0}^m d_j P_{i-j} = \left(\sum_{j=0}^m d_j X_{i-j} \right) \pi + \sum_{j=0}^m d_j v_{i-j} \quad (11)$$

where the differencing coefficients satisfy:

$$\sum_{j=0}^m d_j = 0 \quad (12)$$

(which allows us to drop the non-parametric effect from equation 11) and the normalization condition:

$$\sum_{j=0}^m d_j^2 = 1 \quad (13)$$

(which assures that the transformed residuals have variance σ_v^2). Hall et al., (1990) provide the optimal weights up to $m=10$.

The formulation in (1) follows the literature in assuming that start-up capital is solely a function of wealth (though we relax the assumption that it is a constant proportion of wealth). A

more general specification allows characteristics to influence start-up capital independently of wealth. For example, it may be conjectured that better education allows a worker to borrow more at given wealth. In terms of the model in section 2, individual characteristics might enter either the ϕ function or through differences in r . To allow this we consider the model:

$$P_i = f(W_i + X_i\gamma) + X_i\pi + v_i \quad (14)$$

To test this against (7) we take a first-order Taylor series expansion of the f function:

$$f(W_i + X_i\gamma) = f(W_i) + f_W(W_i)X_i\gamma + \text{residual} \quad (15)$$

where f_W denotes the first derivative of f . So by adding an interaction effect between X and the estimated slopes of the f functions as an additional regressor we can test whether $\gamma = 0$. Under the null hypothesis ($\gamma = 0$) we should find that the estimated parameters of the following regression are jointly insignificant:

$$P_i - X_i\hat{\pi} - f(W_i) = f_W(W_i)X_i\gamma + v_i \quad (16)$$

This supplementary regression thus provides a specification test for our model.⁵

4. Data and descriptive statistics

The survey we use here was done in 1989 by the Tunisian Settled Abroad Office in the Foreign Affairs Ministry, with the collaboration of the Arabic League. The survey was done in all geographical areas of Tunisia (both rural and urban areas). Return migrants are defined as

⁵ We have not seen this test in the literature, and one expects that there would be other application in which this test would be of interest.

workers who have migrated abroad at least once during 1974-86.⁶ This group was over-sampled to get more observations.⁷

The non-migrant sample suggests only a weak correlation between wealth and self-employment. In the data we can measure the wealth accumulated up to 1986. The mean wealth of those who became self-employed between 1974 and 1986 is 689 dinars, while it is 454 for those who did not. However, the difference is not statistically significant (a t-test gives 1.62). If we restrict the sample to the workers who were not self-employed in 1974, the difference between the mean wealth accumulated up to 1986 by self-employed (equal to 689 dinars) and by salaried workers (397 dinars) becomes significant (with a t-test of 2.02).

However, it may well be hard to detect the impact of credit-constraints in the non-migrant sample. We know whether someone is self-employed at the date of interview, or has been so. And we know wealth accumulation up to the interview date. However, there are obvious concerns about the endogeneity of wealth to self-employment in a sample of non-migrants. There is also likely to be considerable heterogeneity in other characteristics that cloud and possibly bias the comparison.

In this paper we focus instead on the sub-sample of returned migrants. Returning from a long period overseas makes a natural break in work history. For such migrants we can measure the probability of self-employment after returning to the home country. And we can identify how much money they brought back from their period overseas, which is pre-determined at the time they make their decision about what work to do on return. This group is also more homogeneous

⁶ 1974 is of some significance since political and economic changes in that year made out-migration towards European countries (the traditional host countries for Tunisian workers) more difficult for most Tunisians.

⁷ See Mesnard (1999, pp. 205-211) for a more detailed description of the survey.

than the population at large, which should also make it easier to detect any relationship between wealth and occupation choice.

The return migrants can be thought of as a sample selected from a set of migrants, not all of which returned. The sample selection process is unknown and we have no data on those who did not return. It is plausible that the probability of returning depends positively on accumulated wealth. Then the wealth effects we see in the data on return migrants also include an unknown selection effect, as well as liquidity constraints.

This does not appear to be a serious concern for the problem at hand. We want to know how important wealth distribution within the home country is to the level of business activity in that country. Since we want to condition on residence in the home country, we need not be concerned about the possibility that return migrants are untypical of migrants that did not return.

Another possible selection bias is more worrying, however. Return migrants may not be typical of the workforce as a whole in the country they return to. This we can test for, using data from the sample of non-migrants. We discuss the details later.

Our main sample covers 1224 male returned migrants who intend to stay indefinitely in Tunisia.⁸ The survey obtained general information about their migration history (number of migrations, dates, locations, return motives, duration, employment) and their working and living conditions during their last migration. To identify new business starts in the data we build a dummy variable equal to one if a worker is self-employed after return and was not self-employed before migrating and equal to zero otherwise. There is comprehensive information on the assets accumulated during their migration. The survey obtained data on a number of obvious control variables, including age and education. Whether one takes up self-employment is also likely to

⁸ We dropped 102 migrants who are temporarily visiting Tunisia for vacation, as well as 12 women.

be correlated with where one lives, as an influence on proximity to markets. However, endogeneity concerns speak against controlling for current location in this context (given that return migrants can in principle choose where to return to). We do include, however, controls for place of birth.

Table 1 provides summary statistics. Column (1) gives data on the sub-sample who had not been self-employed prior to migrating but took up self-employment on return. Column (2) gives data for those who had not been self-employed, and did not take this up on return. Column (3) covers those who had been self-employed previously and those who are salaried on return.

The sub-samples differ in most respects. However, the most striking difference is that workers who take up self-employment after return have accumulated much larger savings (1086 dinars) on average when they were abroad than other workers of the restricted sample who are salaried after return (442 dinars) or than other workers from the full sample (466 dinars).

From the data we also find that those who took up self-employment mainly use their own capital for investment after return: 87.6% of projects are realized with savings accumulated during migration and only 12.4% of migrants received extra funds from special programs (Mesnard, 1999). None of them relied on formal bank credit, though some informal credit was probably available. They explicitly mention their difficulties in getting access to credit markets when asked about the main obstacles faced in starting up their projects.

5. Estimation results

Since we are interested in whether a return migrant enters self-employment we restrict the sample to those who had not previously been self-employed prior to their migration. Table 2 gives the estimated parameters on the control variables. For the distributed lag we set $m=10$ in equation (11), although the results were quite similar with $m=1$.

The control variables are jointly significant, though only a couple of variables are individually significant. Married respondents were less likely to start a new business; those born in the Center-East of Tunisia were more likely to do so. Individual enterprises have flourished in the Center-East region around Sousse, whose inhabitants are relatively mobile and have created networks with migrants working in France, Italy or Germany. The specification test for our model shows that individual characteristics such that education levels do not interact with wealth to affect entrepreneurship. When they influence the decision to start up businesses, they do so independently of wealth. We also estimated the model on the full sample (including those who had been self-employed prior to migrating); the results were very similar.

Figure 3(a) gives the nonparametric regression of $P_i - X_i \hat{\pi}_i$ on wealth. We use the local regression (LOWESS) method of Cleveland (1979).⁹ The relationship is increasing and at least weakly concave over the whole range of the data. When we calculate the predicted probabilities we find that almost all (94%) of the sample is within the (0,1) interval; 6% of the predicted probabilities are negative, and none are above one. Figure 3(b) gives the corresponding regressions without the control variables. We also estimated these regressions without restricting the sample to those who had not been self-employed prior to migrating; the results were very similar to Figure 3.

To test for selection bias in our results we pooled the return migrants with other non-migrant workers and estimated a probit in which the dependent variable took the value one if an observation was in the return migrant sample and zero otherwise. We then included the inverse Mills's ratio from this probit as one of the control variables in the vector X . The wealth variable

⁹ This is closely related to Fan's (1992) method, which has advantages over kernel regression given the uneven spacing of the wealth data at extremes; for further discussion see Fan (1992) and Deaton (1997).

entered linearly in logs in the probit. While the model is identified on nonlinearity, we also used an instrument comprising a dummy variable for whether the worker was older than 18 in 1974. Our idea here is that reaching adulthood in 1974 creates a discontinuity in the probability of migrating after that date but does not affect the probability of starting a new business on return. Otherwise the control variables in X were the same.¹⁰ The probit revealed a number of significant factors in explaining who was a return migrant in the sample, and log wealth, X and the instrument were jointly significant at better than the 0.00005 level.¹¹

However, we found no evidence of selection bias in our main model of business start-ups. The Mill's ratio from the first stage probit was insignificant as an additional control variable; the t-test was 0.239 (0.395 if we drop the dummy for having reached adulthood in 1974 out of the selection equation). So this does not suggest that we need be concerned about selection bias in our estimates of the wealth effect on self-employment. Recall, however, that we cannot rule out selection bias with respect to migrants as a whole, since we do not have data on those that did not return to Tunisia.

We find no evidence of a low-level convexity. The curve is concave for low wealth levels, then becomes more linear for higher values. Adding control variables attenuates slightly the slope of the curve. But the relationship is very similar without controls.

This lack of any sign of non-convexity at low wealth does not contradict the model in section 2. Our results suggest that people can start up a business with relatively little capital. There may still be increasing returns to own wealth as collateral, but this is swamped by the

¹⁰ One minor difference is that we used age in 1986 instead of age at the date of return, for consistency across the samples.

¹¹ The significant variables at the 5% level were log wealth (positive), the instrument (positive), age squared (negative), no education, secondary and higher education level (negative, relative to primary), number of dependents (positive), and being born in the center west or south east (positive).

decreasing returns effect in production (recalling equation 5). Latent heterogeneity in the borrowing constraint or production functions could also hide the convexity at low wealth. For example, suppose that a bank can observe indicators of the likely effort of borrowers and adjusts its collateral requirements accordingly. Then on aggregating across the diverse f functions in estimating the regression one could lose all sign of the convexity at low wealth.

6. Implications

To help interpret our results, we can estimate the contribution of wealth inequality to the average rate of business starts amongst return migrants. This is given by:

$$\Delta \equiv f(\sum_{i=1}^n W_i / n) - \sum_{i=1}^n f(W_i) / n \quad (17)$$

which is positive for f concave. Using the empirical non-parametric regression function the value of Δ is 4% points. With complete equalization of wealth, the predicted rate of new business starts at mean values of the controls is 23.92%, as compared to a predicted mean on the same sample of 19.85%. This must be judged a modest impact given the extent of the wealth redistribution.

A smaller redistribution naturally gives an even lower impact. Suppose that a redistributive wealth tax is introduced. The individual tax rate is an increasing function of initial wealth levels, and is budget neutral i.e.,

$$t_i = T_i / W_i = \alpha + \beta W_i \quad (18)$$

where $\beta > 0$. When the value of α is set to assure that $\sum T_i = 0$ we have:

$$t_i = \beta(W_i - MSW / \bar{W}) \quad (19)$$

where $MSW = \sum W_i^2 / n$ is mean squared wealth and $\bar{W}$ is mean wealth. The value of β determines how much redistribution is achieved. To interpret β suppose that the pattern of taxes and subsidies given by (19) entails tax rate, t^* on the richest person in the sample, with wealth W^* . Then

$$\beta = \frac{t^*}{W^* - MSW / \bar{W}} \quad (20)$$

Using the estimated (individual-specific) first derivatives of f we can estimate the change in the probability of starting a new business for each individual. Adding up these probability changes, we then have a measure of how sensitive the aggregate level of business activity is to the distribution of wealth. (This is not of course a policy simulation; rather it is a means of assessing how responsive the overall rate of business starts is to changes in inequality.)

Table 3 gives the percentage changes in the number of new business starts for various wealth redistributions, as indicated by the mean tax rate on the richest individual. As one would expect, the impact on the aggregate number of new business starts rises with the extent of the redistribution. However, the effect of tax-subsidy scheme entailing even a 50% tax on the richest wealth-holder only increases the average rate of new business start ups amongst return migrants by 0.61% points.

7. Conclusions

We have studied one aspect of the theoretical arguments that have been made linking the composition of economic activity to the distribution of wealth, given credit-market failures. The distribution-dependence of aggregate business activity is theoretically ambiguous in our model. On the one hand, diminishing returns to capital will tend to mean that wealth inequality is bad for the aggregate number of business start-ups at any given mean wealth in the economy. On the

other hand, increasing returns to initial wealth (as the collateral for borrowing to augment initial wealth in capital formation) will tend to mean that inequality is good for aggregate business activity. The outcome is an empirical question.

Rather than impose a specific functional form on the data we have used flexible nonparametric methods to study the empirical relationship between initial wealth and new business start ups. In the hope of better identifying the relationship, we have focused solely on return migrants who have brought back diverse amounts of accumulated savings from their period abroad, and can be expected to be contemplating whether to take up self-employment on returning to their home country.

Our data for Tunisia on new business starts amongst return migrants are consistent with the existence of liquidity constraints on entrepreneurship. We cannot rule out the possibility that wealth is picking up ability differences correlated with wealth, though we do control for obvious ability correlates, such as education. Amongst the variables we have in our data set, wealth appears to be of over-riding importance to whether or not a return migrants starts a new business.

We do not find evidence of a low-level convexity, as one would expect if there were increasing returns to wealth as collateral. The wealth relationship is increasing and at least weakly concave over the range of the data. This suggests that in this setting it is possible to start some sort of business with very little wealth, and that the non-concave borrowing constraint in our theoretical model does not come into play in practice. Start-up capital is some constant multiple of wealth; probably wealth itself in most cases. This is consistent with the fact that none of those interviewed indicated that they had relied on formal credit sources.

These results implies that, at any given mean, the higher the initial inequality of wealth, the lower the overall rate of new business start-ups, through the existence of diminishing returns

to capital. In this sense, our results suggest that inequality is bad for business. However, the quantitative magnitude of this effect is small. Even full equalization of wealth at the same mean would only increase the rate of new business starts amongst return migrants from 20% to 24%. Less redistribution will naturally have less impact. A progressive redistribution entailing a tax rate that rises with wealth, reaching 50% for the richest person, would increase the rate of new business starts by less than one percentage point.

Our findings do not constitute a case for public redistribution of wealth as a means of stimulating business activity. The maximum impact appears to be modest. Nor can we rule out the possibility that the nonlinear wealth effects on self-employment arise from other factors than liquidity constraints; if so, then pro-poor redistribution of wealth may do nothing for the level of new business activity. And even if liquidity constraints are the whole story, if the wealth redistribution entails changing other factors influencing business activity (such as prices or access to markets for outputs and inputs) then the effect is ambiguous. Further research in testing for liquidity constraints and in studying specific interventions will hopefully provide a deeper understanding of the policy implications.

References

- Aghion , Philippe, Eve Caroli, and Cecilia Garcia -Penalosa, 1999, "Inequality and Economic Growth: The perspective of the New Growth Theories", *Journal of Economic Literature* (December): 1615-1660.
- Aghion, Philippe and Patrick Bolton, 1997, "A Theory of Trickle-Down Growth and Development," *Review of Economic Studies* 64: 151-172.
- Atkinson, A.B., and A. Brandolini, 1999, "Promise and Pitfalls in the Use of 'Secondary' Data Sets: Income Inequality in OECD Countries," mimeo, Nuffield College Oxford.
- Banerjee, Abhijit and Esther Duflo, 2000, "Inequality and Growth: What Can the Data Say?", NBER Working Paper 7793.
- Banerjee, Abhijit V., and Andrew F. Newman, 1993, "Occupational Choice and the Process of Development," *Journal of Political Economy* 101(2): 274-298.
- Benabou, Roland, 1996, "Inequality and Growth", in Ben Bernanke and Julio Rotemberg (eds) *National Bureau of Economic Research Macroeconomics Annual*, Cambridge: MIT Press, pp.11-74.
- Blanchflower David G., and Andrew J. Oswald, 1998, "What Makes an Entrepreneur? Evidence on Inheritance and Capital Constraints," *Journal of Labor Economics* 16(1): 26-60.
- Cleveland, William S., 1979, "Robust Locally Weighted Regression and Smoothing Scatter Plots," *Journal of the American Statistical Association* 74: 829-36.
- Deaton, Angus, 1997, *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy*, Baltimore: Johns Hopkins University Press for the World Bank.
- Evans, David S. and Boyan Jovanovic, 1989, "An Estimated Model of Entrepreneurial Choice under Liquidity Constraints," *Journal of Political Economy* 97(4): 808-827.
- Evans, David S and Linda S. Leighton, 1989, "Some Empirical Aspects of Entrepreneurship", *American Economic Review* 79 (3): 519-535.
- Fan, Jianqing, 1992, "Design-Adaptive Nonparametric Regression," *Journal of the American Statistical Association* 87: 998-1004.
- Hall, Peter, J.W. Kay, and D.M. Titterton, 1990, "Asymptotically Optimal Difference-Based Estimation of Variance in Nonparametric Regression," *Biometrika* 77: 521-28.
- Holtz-Eakin, Douglas, David Joulfaian. and Harvey S. Rosen,1994, "Entrepreneurial decisions and liquidity constraints" *RAND Journal of Economics*, 25, No. 2, 334-347.

- Magnac, Thierry and Jean-Marc Robin, 1996, "Occupational choice and liquidity constraints" *Ricerche Economica* 50, 105-133.
- Mesnard Alice, 1999, "Migration internationale, accumulation d'épargne et retour des travailleurs" PhD. dissertation, Ecole des Hautes Etudes en Sciences Sociales, Paris.
- Paulson, Anna and Robert Townsend, 2000, "Entrepreneurship and Liquidity Constraints in Rural Thailand", mimeo, University of Chicago.
- Piketty, Thomas, 1997, "The dynamics of the wealth distribution and the interest rate with credit rationing" *Review of Economic Studies* 64: 173-189.
- Ravallion, Martin, 1998, "Does Aggregation Hide the Harmful Effects of Inequality on Growth?" *Economics Letters*, 61(1): 73-77.
- Robinson, Peter, 1988, "Root-N-Consistent Semi-Parametric Regression," *Econometrica* 56: 931-54.
- Yatchew, Adonis, 1998, "Nonparametric Regression Techniques in Economics," *Journal of Economic Literature* 36(June): 669-721.

Figure 1: Stylized relationship between entrepreneurship and wealth

Figure 2: Borrowing constraint

Figure 3: New business starts and initial wealth

(a) With controls

(b) Without controls

Table 1 : Descriptive statistics

	Not previously self-employed			
	(1) Took up self- employment (n=210)	(2) Others (n=840)	(3) Rest of full sample (n=1014)	(4) Total sample (n=1224)
Age at return	34.87 (10.60)	32.44 (10.66)	33.66 (0.38)	33.87 (11.13)
No education (%)	36	33	38	38
Primary school (%)	46	50	46	46
Short secondary school (%)	4	5	4	4
Long secondary school (%)	13	12	11	12
Number of dependents	5 (2.94)	4.55 (2.93)	4.79 (2.96)	4.82 (2.96)
Married (%)	81	80	82	82
Born in area of Tunis (%)	5	5	4	5
Born in Center East (%)	23	19	21	21
Born in Center West (%)	21	24	24	24
Born in Southern East (%)	16	23*	22*	21
Born in Southern West (%)	10	11	10	10
Born in Northern East (%)	8	6	6	6
Born in Northern West (%)	17	13	13	13
Savings at return	1086.2 (1539.13)	442.35* (951.77)	465.9* (926.45)	580.10 (1091.94)

(* significantly different from the mean in column (1), t-test)

Table 2 : Parameters on control variables in explaining the probability of starting a business amongst return migrants

	Coefficient (t-ratio)
age at return	0.011 (1.84)
age squared	0.000 (1.5)
no education	0.053 (1.2)
short secondary school	-0.103 (1.17)
long secondary school	-0.021 (0.43)
married	-0.133 (2.96)**
number of dependents	0.003 (0.40)
born in Center East	0.107 (1.88)*
born in Center West	-0.009 (-0.18)
born in Northern East	-0.003 (0.05)
born in Northern West	0.013 (0.22)
born in South East	-0.067 (1.28)
born in area of Tunis	-0.07 (0.94)
Constant	-0.002 (0.13)
Observations	695
R-squared	0.04
Tests of $\gamma = 0$: F(13,869)	0.79
	Prob=0.67

Note: Robust t-statistics in parentheses; one extreme value (savings=20550) dropped.
 *significant at 5% level; ** significant at 1% level.

Table 3: Effects of wealth redistribution on the number of business start-ups

t^*	Absolute change (% points)	% change ($\bar{P}=19.85\%$)
5%	0.06	0.30
10%	0.12	0.60
25%	0.31	1.56
50%	0.61	3.07

Note: The table gives the predicted changes in the proportion of previously not self-employed return migrants who take up self employment as a result of a progressive tax/subsidy scheme such that the richest individual has a tax rate of t^* .

Policy Research Working Paper Series

Title	Author	Date	Contact for paper
WPS2505 Family Altruism and Incentives	Roberta Gatti	December 2000	R. Bonfield 31248
WPS2506 Ethnicity and Wage Determination in Ghana	Abigail Barr Abena Oduro	December 2000	R. Bonfield 31248
WPS2507 Public Expenditures and Environmental Protection: When Is the Cost of Funds Irrelevant?	Gunnar S. Eskeland	December 2000	H. Sladovich 37698
WPS2508 Sources of Financial Assistance for Households Suffering an Adult Death in Kagera, Tanzania	Mattias Lundberg Mead Over Phare Mujinja	December 2000	V. Soukhanov 35271
WPS2509 How Tax Policy and Incentives Affect Foreign Direct Investment: A Review	Jacques Morisset Neda Pirnia	December 2000	N. Busjeet 33997
WPS2510 Environmental Protection and Optimal Taxation	Gunnar S. Eskeland	December 2000	H. Sladovich 37698
WPS2511 Monetary Policy under Flexible Exchange Rates: An Introduction to Inflation Targeting	Pierre-Richard Agénor	December 2000	M. Gosiengfiao 33363
WPS2512 Quantifying the Impact of Technical Barriers to Trade: A Framework for Analysis	Keith E. Maskus John S. Wilson Tsunehiro Otsuki	December 2000	L. Tabada 36896
WPS2513 Do State Holding Companies Facilitate Private Participation in the Water Sector? Evidence from Côte d'Ivoire, the Gambia, Guinea, and Senegal	Michel Kerf	December 2000	M. Leon 36151
WPS2514 Intersectoral Dynamics and Economic Growth in Ecuador	Norbert M. Fiess Dorte Verner	January 2001	A. Pillay 88046
WPS2515 Firm-Level Survey Provides Data on Asia's Corporate Crisis and Recovery	Mary Hallward-Driemeier	January 2001	E. Khine 37471
WPS2516 Does Decentralization Increase Responsiveness to Local Needs? Evidence from Bolivia	Jean-Paul Faguet	January 2001	H. Sladovich 37698
WPS2517 The Effect of International Monetary Fund and World Bank Programs on Poverty	William Easterly	January 2001	K. Labrie 31001

Policy Research Working Paper Series

	Title	Author	Date	Contact for paper
WPS2518	Can Reforming Global Institutions Help Developing Countries Share More in the Benefits from Globalization?	Andrés Solimano	January 2001	R. Bonfield 31248
WPS2519	Is Investment in Africa Too Low or Too High? Macro and Micro Evidence	Shantayanan Devarajan William R. Easterly Howard Pack	January 2001	H. Sladovich 37698
WPS2520	Wage Effects of Unions and Industrial Councils in South Africa	Kristin F. Butcher Cecilia Elena Rouse	January 2001	P. Sader 33902
WPS2521	Labor Market Rigidity and the Success of Economic Reforms across More than 100 Countries	Alvaro Forteza Martin Rama	January 2001	P. Sader 33902
WPS2522	Trade in International Maritime Services: How Much Does Policy Matter?	Carsten Fink Aaditya Mattoo Ileana Cristina Neagu	January 2001	L. Tabada 36896
WPS2523	Can Duty Drawbacks Have a Protectionist Bias? Evidence from Mercosur	Olivier Cadot Jaime de Melo	January 2001	L. Tabada 36896
WPS2524	Racing to the Bottom? Foreign Investment and Air Pollution in Developing Countries	David Wheeler	January 2001	D. Wheeler 33401
WPS2525	Measuring Education Inequality: Gini Coefficients of Education	Vinod Thomas Yan Wang Xibo Fan	January 2001	A. Datoloum 36334
WPS2526	Linking Participatory Poverty Assessments to Policy and Policymaking: Experience from Vietnam	Carrie Turk	January 2001	H. Sutrisna 88032

1/25