IRPET Istituto Regionale Programmazione Economica della Toscana

The ambiguous effects of public assistance to youth and female startups between job creation and entrepreneurship enhancement

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Setting the scene

Start-up programs often have the dual ambition of fostering self-employment of disadvantaged individuals while nurturing entrepreneurship

	Nurture entrepreneurship	Promote self-employment
Rationale	Lack of capital and of borrowing opportunities	Disadvantaged individuals may lack finance, know-how, experience, contacts, …
Previous results	☹ They are few and cast doubts on these programs' ability to intercept entrepreneurial talents and promote self-sustainable firms *Battistin et al., 2001; Mealli and Pagni, 2001; Caliendo et al., 2015*	☺ Programs are successful according to many studies. Sometimes, they are found to guarantee "double dividends" (e.g. +innovation; + employment; + fertility) *See the review by Caliendo (2016)*

Our contribution

… to enterprise/labor policy debate

- Previous studies look at this programs either as labor or as enterprise policy
- We take both perspectives and investigate whether the self employment, the job creation and the entrepreneurship promotion goals go hand in hand

… to empirical economist interested in the application of statistical methods

- Key parts of our “counterfactual” analysis rely on tools of duration analysis, while maintaining a non-parametric spirit
- When analyzing effects on job creation, we implement a solution that avoids “imputing” zero hirings after the firm dies

The program under investigation

- **Program**: Financial assistance to youth and female startups provided from 2011 by the program “Fare impresa” / Tuscany
- **Support**: partial credit guarantee combined with subsidized interest rates. Financial operations could have a duration of 16-120 months, with the guarantee covering up to 80% of the loan requested to the bank
- **Target firms**: newly established companies (less than 2 years old at the time of the application or firms that will be established within 6 months from the receipt of support), as well as to expanding enterprises that were 2-5 years old at the time of application
- **Applicants**: may be youth aged 18-40 and, with no age limit, females and subsidized unemployed

Definition of treatment (*L*) in our study

Out of 1,939 firms that deserve the guarantee according to a specialized financial intermediary owned by regional government and that therefore apply for a (guaranteed) bank loan

L = 1 Obtain the loan and, therefore, the interest rate subsidy
1,656 firms
Avg loan 59,000 euros

L = 0 Do not obtain the loan
283 firms

Data

Source	Information drawn from this source
Administrative archive of the companies participating in the program, held by the regional government	Date of establishment; business sector; legal form; female/youth; newly established /expanding; dates on which the guarantee is requested to and finally granted by the intermediary; the name of the bank to which the loan request is submitted; and the date on which the company eventually obtains the loan from the bank (if any); …
Business Register (Chambers of Commerce)	Date of business cessation (if any)
Job Information System (Sistema Informativo Lavoro) held by Employment Services	For each firm: date of hiring of employees; type of contract; expected contract duration, …

Selected descriptive statistics (Proportions/Means)

	***G* =1**	***G*=1, *L*=1**	***G*=1, *L*=0**
Youth start-up (1/0)	0.762	0.760	0.770
Female start-up (1/0)	0.571	0.576	0.540
Newly established firm (1/0)	0.921	0.925	0.901
Sole proprietorship (1/0)	0.606	0.597	0.657
Firm activity (categorical):			
manufacturing	0.111	0.107	0.131
trade	0.327	0.332	0.296
hotel/restaurant	0.276	0.285	0.226
travel agency/rental	0.035	0.032	0.051
entertainment/recreation	0.024	0.024	0.029
hairdresser/beauty parlor	0.122	0.130	0.080
other	0.105	0.090	0.186
No. of employees hired prior to the guarantee with:			
permanent contract	0.624	0.626	0.617
fixed-term contract up to 2 months	0.147	0.153	0.113
fixed-term contract 2-5 months	0.206	0.208	0.193
fixed-term contract 5-12 months	0.237	0.242	0.208
fixed-term contract 12+ months	0.292	0.310	0.193
Loan is requested to a local/mutual bank (1/0)	0.531	0.553	0.401

Research questions and related estimands

- ***Does the treatment guarantee longer self-employment?***

  Length of self-employment proxied by $\tilde{Y}_i(l)$, the survival time for firm i after the guarantee is obtained given assignment to treatment l.

  $ATT_S(t) = S_{1|L=1}(t) - S_{0|L=1}(t) = Pr(\tilde{Y}_i(1)>t \mid L=1) - Pr(\tilde{Y}_i(0)>t \mid L=1)$

- ***Do aided firms enjoy lower risk of business cessation?***

  Instantaneous hazard rates allow to assess the quality of the created entrepreneural capacity (e.g., Battistin et al, 2001)

  $ATT_h(t) = h_{1|L=1}(t) - h_{0|L=1}(t) = [lim_{\Delta t->0} P(t<\tilde{Y}_i(1)\leq t+\Delta t \mid \tilde{Y}_i(1)>t, L=1)/\Delta t] - [lim_{\Delta t->0} P(t<\tilde{Y}_i(0)\leq t+\Delta t \mid \tilde{Y}_i(0)>t, L=1)/\Delta t]$

- ***Do aided firms open more job positions, thus ensuring a double dividend?***

  Let $Y_i(l)$ now denote the number of job positions opened by firm i after the guarantee, given assignment to treatment l.

  $ATT_J = E[Y_i(1) - Y_i(0) \mid L=1]$

  assessed at three different time points: within 12 months, 12-24 months, and 24-36 months after the guarantee.

How do we estimate the previous quantities?

❑ Under the assumption of ***strong ignorability*** (unconfoundedness + overlap), we resort to ***propensity-score matching*****.**

In theory, the propensity score (Rosenbaum and Rubin, 1983): i) is a balancing score; ii) if treatment assignment is strongly ignorable given X_i, then it is also strongly ignorable given the propensity score.

❑ ***Covariate-balancing propensity score -CBPS*** (Imai and Ratkovic, 2014), is a generalized-method-of-moments estimator of the PS that optimizes covariate balance. To ensure that our propensity scores are balancing scores, we estimate two distinct CBPSs for the groups of youth and female start-ups.

Variables summarized by the CBPS: sole proprietorship (1/0), sector (cat.), youth/female; brand new/expanding firm; No of employees already hired, per type of contract; loan requested to mutual bank (1/0); urban/rural context; unemployment rate in LLS; corporate concentration of loan supply in LLS.

❑ ***Nearest-neighbor matching***, with replacement

More on the estimation of the effect on job openings (1)

Problem: the count job openings after treatment is observable as long as the firm remains alive, then it does not exist. In turn, the fact of being alive may be also affected by treatment

Possible approaches:

Approach	Pros	Cons
(1) Estimate ATT_J conditional on firm survival	None, apart that it is easy	This is not a causal effect, as we are comparing different sets of units
(2) "Impute" zero hirings to closed businesses	Rather in line with common practice in empirical microeconometric studies	Is zero a reasonable value for hirings for closed firms? If so, we have no longer a missing data problem
*(3) Assume ignorability of missing hirings conditional on **X** and L, and re-weight*	Reweighting allows to estimate unbiased effects. Common in studies with longitudinal treaments, e.g. in epidem./biostat.	Strong assumption, not directly verifiable from the data
(4) Principal stratification to account for intermediate business closure	Fully acknowledges the endogeneity of closures (outcome truncated by death)	Strong increase in complexity (theoretical and computational). Local effect defined only for the latent stratum of "always survivors"

More on the estimation of the effect on job openings (2)

We take the approach N. 3

Under the assumption that there are no unmeasured confounders for both treatment and loss to follows-up due to death, we apply the nearest neighbor estimator to outcomes weighed by the inverse of probability of surviving

Let $C_{i,s}$ be a binary indicator equal to 1 if firm i dies in the year s, s=1,2,3,
and let $Y_{i,s}$ be the observed number of job positions opened by firm i during the s^{th} year, s=1,2,3.

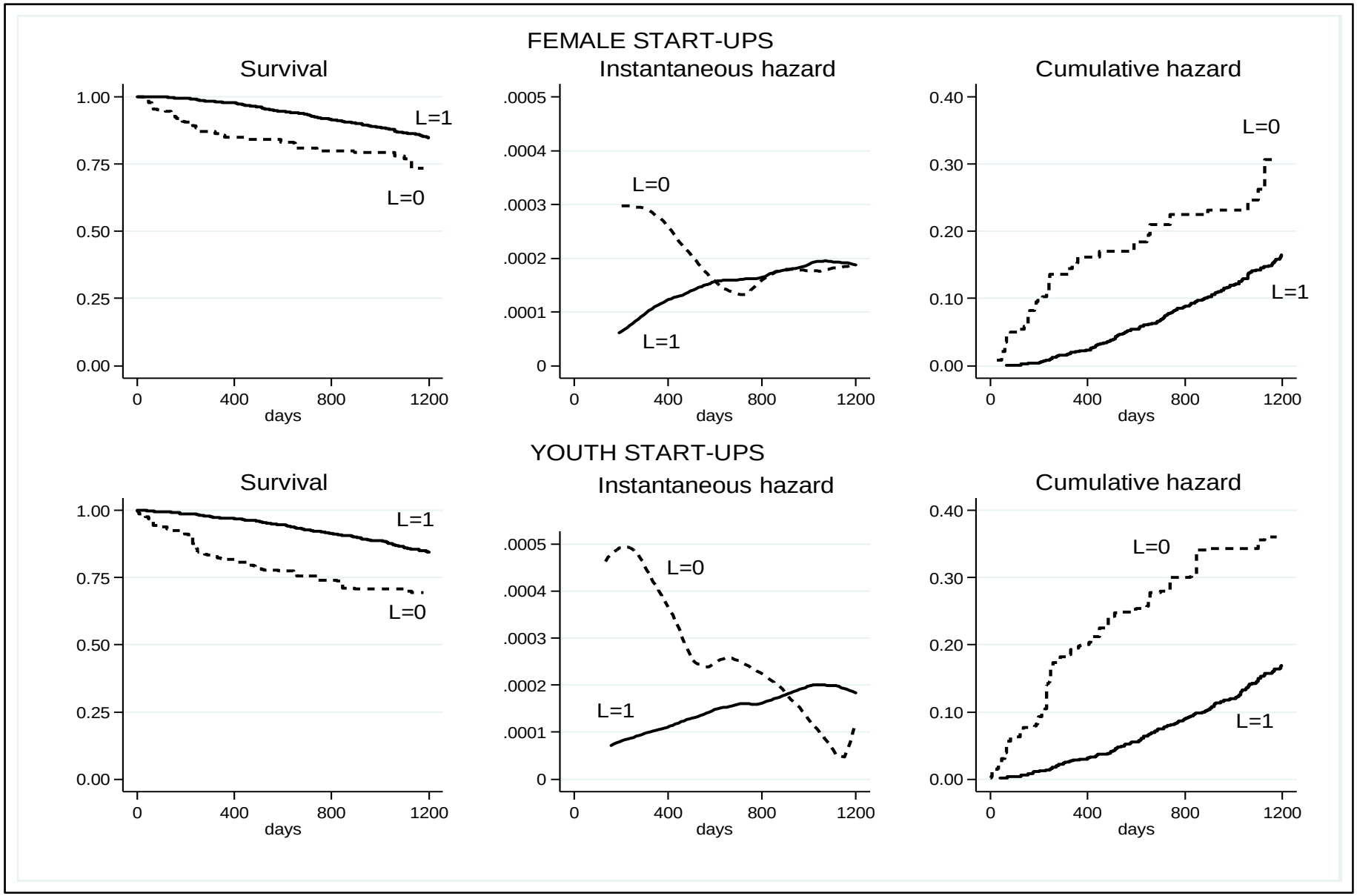
- $w_{i,s=1}$ =1 for all i, because all firms participating in the study are alive for at least one day, and thus can hire new employees in the first year

- $w_{i,2}=Pr(C_{i,1} = 0 \mid \boldsymbol{X}_i, L_i)/Pr(C_{i,1} = 0 \mid \boldsymbol{X}_i, L_i, \boldsymbol{Y}_{i,1})$

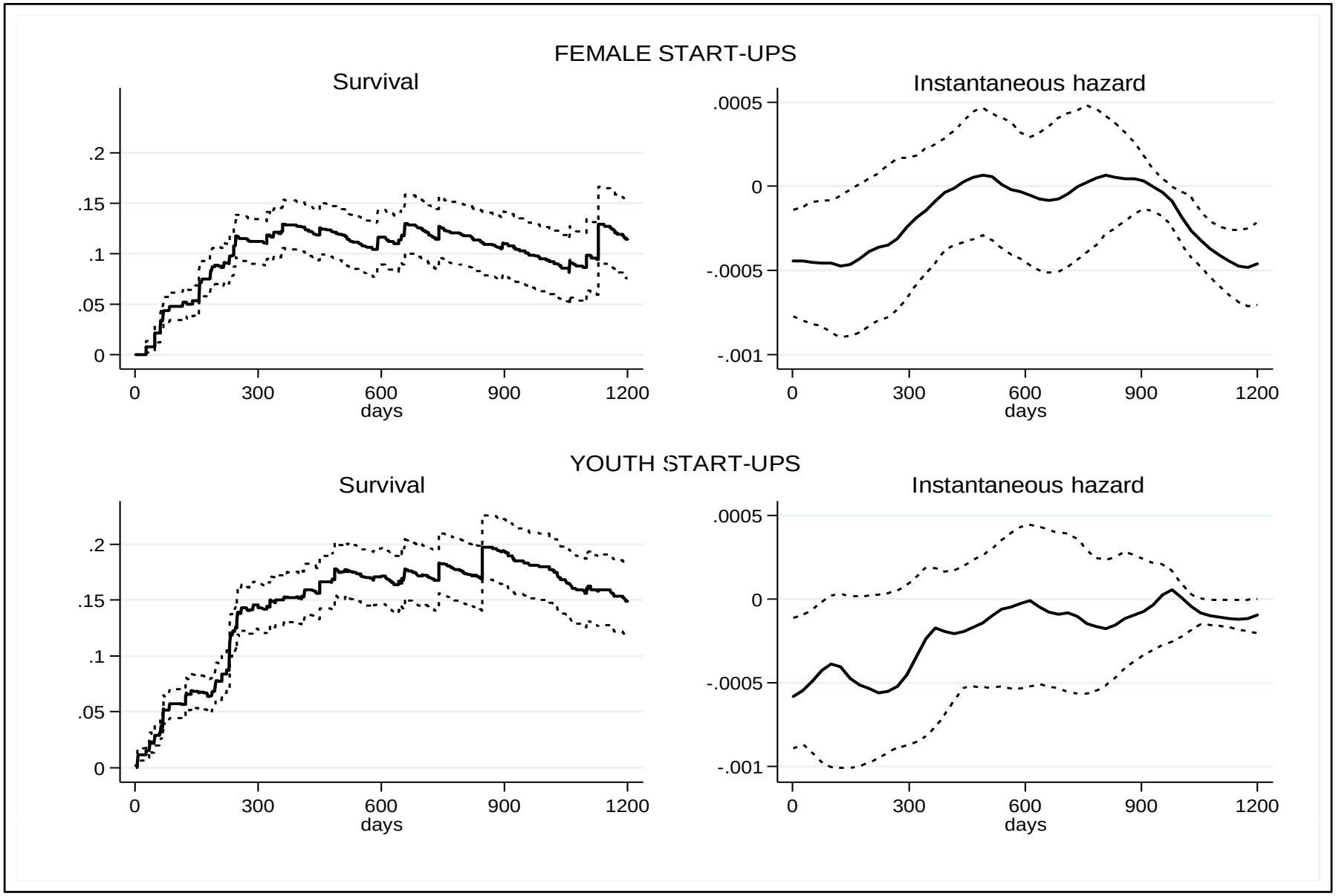
- $w_{i,3}=\{Pr(C_{i,1}=0|\boldsymbol{X}_i, L_i)Pr(C_{i,2}=0|C_{i,1}=0, \boldsymbol{X}_i, L_i)\}/\{Pr(C_{i,1}=0|\boldsymbol{X}_i, L_i, \boldsymbol{Y}_{i,1})Pr(C_{i,2}=0|C_{i,1}=0, \boldsymbol{X}_i, L_i, \boldsymbol{Y}_{i,1}, \boldsymbol{Y}_{i,2})\}$

Estimates of all the probabilities in the two previous equations are obtained using logit models

Let us have a look at survival and hazard functions



Estimated $ATT_S(t)$ and $ATT_h(t)$ (95% C.I. in parentheses)



Sensitivity analysis

Objective: To assess whether modest departures from the unconfoundedness assumption can change the results substantially

How strong should the unobserved "confounder" be in order to kill our positive results on firm survival?

How we do it: we use the Monte Carlo simulation-based approach proposed by Ichino et al. (2008), using a binary outcome, Y, equal to 1 if a firm does not die during the observation period and 0 otherwise

Findings:

- ❑ in order turn the effect from significant to insignificant, the strength of the unobserved confounder should be considerably high, both for female and youth start-ups
- ❑ since it may be hard, in our application, to envision so much influential unobserved confounders, we may conclude that our results are robust to reasonable failures of the unconfoundedness assumption that made their identification possible

Estimated ATT_J (S.E. in parentheses)

	FEMALE START-UPS		*YOUTH START-UPS*	
Fixed-term positions opened within 12 months	0.726**	(0.287)	0.787	(0.515)
Fixed-term positions opened 12-24 months afterwards	-0.0696	(0.412)	0.453	(0.651)
Fixed-term positions opened 24-36 months afterwards	0.218	(0.300)	0.540	(1.076)
Permanent positions opened within 12 months	0.515**	(0.253)	0.215	(0.156)
Permanent positions opened 12-24 months afterwards	0.350**	(0.154)	0.372*	(0.213)
Permanent positions opened 24-36 months afterwards	0.0719	(0.167)	0.129	(0.135)

Results do not change much if, instead of approach N. 3 (Weighting by the inverse of probability of survival), we take approach N. 2 (Impute zero hirings to closed businesses)

Conclusions

- ✓ Any judgement depends of which, between employment and entrepreneurship, occupies a higher rank in the economic policy agenda
- ✓ Program able to improve self-employment prospects and, possibly, to induce some further job openings
- ✓ This occurs at the price of committing public resources towards entrepreneurial projects that do not really improve their efficiency and self-sustainability over time → they simply survive longer because the treatment diminishes risk at the very start, but not later
- ✓ Need to improve these programs so that start-ups receive not only financial support, but also appropriate coaching and/or mentoring to improve efficiency and self-sustainability