



**Departamento de Economía**  
Facultad de Ciencias Sociales  
Universidad de la República

**Documentos de Trabajo**

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A Methodological Note**

**Andrea Doneschi y Rossana Patron**

**Documento No. 15/11**  
Agosto 2011

ISSN 0797-7484

# Assessing Incentives and Risks in Training Decisions

## A Methodological Note

Andrea Doneschi\*

Rossana Patron\*\*

University of Uruguay

### Abstract

This article discusses training decisions using an approach that considers the wage gap and the probability of employability gap pre- and post training, taking the gains from these two elements as the key to the decision to undertake training. The application of this approach to the Uruguayan case, given the surprisingly low participation in public training programs suggests as a likely hypothesis that public training provision is not attractive enough for unskilled workers because of the limited benefits reported to potential trainees, even discounting for cash incentives to participate. Other explanations are not ruled out. A long-term policy recommendation is to strengthen basic education, as education and training seem complementary rather than substitutes.

Keywords: public training, education policy.

### Resumen

El presente artículo discute las decisiones de capacitación basadas en un enfoque que considera la brecha salarial y la probabilidad de empleabilidad pre y post entrenamiento, tomando las ganancias en estos elementos como las claves en la decisión. La aplicación de este enfoque para el caso de Uruguay, sugiere, en función de la observada escasa participación en los programas de entrenamiento, como hipótesis probable que los programas públicos de capacitación no son suficientemente atractivos para los trabajadores no calificados debido a los limitados beneficios que reportan a los potenciales demandantes de capacitación, aun descontando eventuales subsidios directos para participar de los programas. Sin embargo, otras explicaciones no son descartadas. Como recomendación de largo plazo surge el promover el fortalecimiento de la educación básica ya que la educación formal y el entrenamiento parecen comportarse más como complementarios que como sustitutos.

Palabras clave: programas de capacitación, política educativa.

JEL: I28, J68

\*e-mail: [andrea@decon.edu.uy](mailto:andrea@decon.edu.uy)

\*\*e-mail: [rossana@decon.edu.uy](mailto:rossana@decon.edu.uy)

## **I Introduction**

External shocks, changing patterns in demands, or innovation cause alterations in sectoral activities, which necessarily induce resource reallocation. However, factors may prove difficult to move speedily, or may be inadequate for alternative uses. An important limitation is when those factors are in fixed supply in the economy and new sectors are expanding. Education and training may ease the intersectoral mobility of workers, allowing the reallocation of workers to jobs in booming sectors or in sectors. Ideally, education policies should be designed with a forward-looking perspective, considering the challenge that the future would bring, in particular, considering the economic trends in trade, technology, and innovation. However, it seems that the past is very much relevant in designing remedial training programs for dislocated workers during unemployment crisis, paying attention to riskier jobs during an economic downturn, to be able to have adequate contingency plans in place as stand by.

Training programs can be very differently designed, whether they are to be used as contingency plans either as a continuous support to upgrade skills according to changes in technology or as requirements of expanding sectors. However, what could seem a good training program as a contingency plan may not be the better option for continuous training programs. If there is a role for the public sector in training, it is to ease workers' mobility in a crisis or to accompany changing patterns in demand and technical progress, as public intervention would reduce productivity loss and/or unemployment. Much is written on the role of the government as provider of education and training (e.g. Poterba, 1994, Beauchemin, 2001, Trostel, 2002; De Fraja, 2005, OECD et al. 2010, among others) and on evaluation of the performance of public training programs (e.g. Sims, 1993; LaLonde, 1995, Courty and Marschke, 1997, 2003, 2007; Greenberg et al. 2003, 2004; Dmitrijeva and Hazans, 2007, among many). These issues will not be discussed in this article, as the focus will be instead on workers' decision to undertake training, in particular public training. Education and training is essentially a decision to invest in human capital (as noted by the pioneering work by Becker, 1962, and Ben-Porath, 1967, among others), but there is also a vast literature exploring the fundamentals for not engaging in further qualifications (e.g., Comay et al., 1976; Manski, 1989; Koshal et al., 1995; Eckstein and Wolpin, 1999; Thomas et al. 2002; and Oureopoulos, 2003).

Educational institutions, firms, and training centers, private or public, have a dominant role in generating skills. As in any investment decisions, individuals would compare the potential benefits of acquiring further qualifications against the required costs to obtain it. Training programs could offer the chance to receive a qualification, in a labour market where the demand for skills is on the rise, and in a market that penalises the less skilled with low wages, higher unemployment rates, and harsher working conditions.

However, workers' decisions are not always easy to understand. For instance, in Uruguay the rising demand for skills is well documented, as well as the scarcity of qualified workers.(e.g., PNUD, 2005; Vaillant et al. 2009). However, in Uruguay, workers' participation in public training programs is scarce. There are at least three possible hypotheses to explain it: 1) public provision is rationed; 2) the benefits of available training programs are low; 3) unskilled workers are too anxious, therefore, strong/er incentives would be needed.

The reality in Uruguay seems to show that there is no shortage of options and providers of training programs, with a variety of aims, formats, and target groups. The official institution, El Instituto Nacional de Empleo y Formación Profesional (INEFOP) is in charge of public training; and the offer is varied. In addition, other institutions offer training: Consejo de Capacitación Profesional (COCAP) works in close collaboration with the private sector and MIDES (Ministry of Social Development) offers programs particularly for the vulnerable population. Thus, this article aims to provide a basic approach to assist us in assessing the rationality of workers' decisions to engage in public training.

The rest of the article is organized as follows. In Section II, the fundamentals of the theoretical framework are explained; Section III presents an application to the Uruguayan case; and the Section IV concludes.

## **II Training or not? Key elements**

Education and training determine the qualifications of the labor force, and the nature of those qualifications may affect labor mobility. Workers with different skills have different productivity and wages, as well as differing in their intersectoral mobility and opportunities of finding a job.

The complete specification of workers' decision would require the specification of the parameters corresponding to the probability of unemployment, the cost of training, and the expected wage gain with training. In a two-period model, assuming constant wages, lifetime income for an individual with and without training is

$$I_{NT} = w_2 p_{NT} + w_2 p_{NT} \beta$$

where  $w_2$  is the wage rate of an unskilled worker,  $p_{NT}$  is the probability of remaining employed,  $\beta$  is the subjective discount factor,  $\beta = 1/(1+d)$ ,  $d$  is the discount rate. For those workers who undergo training, lifetime earnings are

$$I_T = \theta w_2 + w_1 p_T \beta$$

where  $\theta$  is the proportion of an unskilled wage rate that the individual pays for or receives as stimulus to receive training, including opportunity costs ( $\theta \geq 0, \theta \leq 0$ ).

The wage gap can be expressed as  $g_1 = w_1/w_2$ ,  $g_1 > 1$ , the employability gap between trained and not trained can be expressed as  $g_2 = p_T/p_{NT}$ ,  $0 < g_2 < 1$ . In general terms, a worker will choose training if  $I_T > I_{NT}$ , normalizing  $w_1 = 1$

$$\beta \left( g_1 - \frac{1}{g_2} \right) > 1 - \frac{\theta}{p_{NT}}$$

Given the above expression, and considering the parameters involved, a worker is more likely to choose training when

- The greater is the wage gap ( $g_1$ ), as this makes training more attractive.
- The greater is the gain in probability of employability if trained ( $g_2$ ).
- The greater is the payment to workers during training, and the higher is the probability of being unemployed of those untrained.

Personal traits also play a role, as lower the discount is (high  $\beta$ ), so the less impatient individuals are more likely to undertake training.

### III Examining the Uruguayan case

Available data on training in 2006 from the National Census Bureau in Uruguay allows presenting a fairly complete description of the provision of training. The Panel A of Table 1 shows that the majority of participants in training programs finance the courses themselves, and that there is an important participation of firms in the provision of training, higher than that for the public sector. It is noteworthy that the unskilled workers group undertaking training is by far the smallest one.

**Table 1 Structure of training programs by skill group and source of funding (%) - Uruguay 2006**

PANEL A

	<b>Unskilled</b>	<b>Medium skilled</b>	<b>Skilled</b>	<b>Total</b>
Publicly funded	3	10	3	17
Financed by firms	3	16	6	25
Paid by the worker	1	37	12	49
Training scholarship	6	2	1	9
<b>Total</b>	12	66	21	100

PANEL B

	<b>Unskilled</b>	<b>Medium skilled</b>	<b>Skilled</b>	<b>Total</b>
Publicly funded	19	61	20	100
Financed by firms	11	66	23	100
Paid by the worker	1	76	23	100
Training scholarship	64	28	8	100
<b>Total</b>	12	66	21	100

PANEL C

	<b>Unskilled</b>	<b>Medium skilled</b>	<b>Skilled</b>	<b>Total</b>
Publicly funded	26	16	16	17
Financed by firms	23	25	27	25
Paid by the worker	5	56	54	49
Training scholarship	46	4	3	9
<b>Total</b>	100	100	100	100

Source: Own elaboration with data from National Census Bureau (INE, 2006). Workers groups: Unskilled (less than 9 years of schooling), Medium skilled (9 –15), Skilled (16 or more).

The Panel B of Table 1 shows the provision of public training is allocated to about 60% of the medium skilled, and around 20% each to the skilled and unskilled. The structure of provision of the private sector is quite similar (though with a stronger participation of the skilled). Regarding Panel C, as might have been suspected, the unskilled rely almost

absolutely on the provision of training by firms or the public sector, contrary to the higher qualified groups that in their absolute majority finance training themselves.

The structure of participants in training courses by employment status (employed or unemployed) is similar to that in the entire labor force, though interesting details arise. The Panel A of Table 2 shows that the vast majority of trainees are medium skilled employed workers (58%). Panel B shows that there is not much difference among the less skilled (unskilled and medium skilled) in undertaking training, being employed or not. The final Panel C in Table 2 shows that although training for the employed favor the more skilled (skilled and medium skilled), training programs for the unemployed prioritises the provision to the less skilled (unskilled and medium skilled); in any case the dominant group is the medium skilled.

**Table 2 Participants in training by employment situation (%) – Uruguay 2006**

PANEL A

	<b>Unskilled</b>	<b>Medium skilled</b>	<b>Skilled</b>	<b>Total</b>
Employed	10	58	20	89
Unemployed	2	8	1	11
Total	12	66	21	100

PANEL B

	<b>Unskilled</b>	<b>Medium skilled</b>	<b>Skilled</b>	<b>Total</b>
Employed	85	88	93	89
Unemployed	15	12	7	11
Total	100	100	100	100

PANEL C

	<b>Unskilled</b>	<b>Medium skilled</b>	<b>Skilled</b>	<b>Total</b>
Employed	12	66	22	100
Unemployed	17	71	13	100
Total	12	66	21	100

Source: Own elaboration based with data from INE (2006).

The information in Table 3 is restricted to public training programs, where it is worthwhile noting in Panel C that the allocation of training resources has a strong emphasis on the unskilled between the unemployed, however, that is not the case for the employed.

**Table 3 Structure of participants in public training programs – Uruguay 2006**

## PANEL A

	Unskilled	Medium skilled	Skilled	Total
Employed	15	53	18	86
Unemployed	4	8	1	14
Total	19	61	20	100

## PANEL B

	Unskilled	Medium skilled	Skilled	Total
Employed	77	87	94	86
Unemployed	23	13	6	14
Total	100	100	100	100

## PANEL C

	Unskilled	Medium skilled	Skilled	Total
Employed	17	61	21	100
Unemployed	32	60	8	100
Total	19	61	20	100

Source: Own elaboration based with data from INE (2006).

A final dimension is given by the percentage of those receiving training by qualification and employment status, as shown in Table 4. Firstly, in all categories, the share of participants in training in the entire workforce is very small. Secondly, this share is increasing with the level of qualification. Thirdly, the higher participation is for the unemployed for all qualification levels, but the difference is not that relevant.

**Table 4 Participants in training by employment status (% over relevant group)- Uruguay, 2006**

Total training programs			Public training programs		
	Employed	Unemployed		Employed	Unemployed
Unskilled	1.3	1.5	Unskilled	0.3	0.6
Medium skilled	5.2	5.5	Medium skilled	0.8	0.9
Skilled	7.1	8.3	Skilled	1.1	1.1
Total	4.0	3.9	Total	0.7	0.8

Source: Own elaboration with data from INE (2006).

The picture Table 4 presents seems odd and difficult to explain. For instance, the participation in training is low even for public programs; unemployed people do not reveal a strong demand for training, nor do the unskilled workers. . Why are people not engaging much in training? Is not a rentable enough activity? Is there a shortage of funds to offer public training programs? Is the available supply of training courses inadequate? Should



incentives be stronger? The analytical approach may assist us to shed some light on these points.

The approach presented in Section II is applied to the Uruguayan case. The computations below assume a base training program of one year and prospective trainees' working life of 30, 10, or 5 years, respectively, to accommodate for different types of prospective jobs (in particular, temporary jobs nonrenewable) as well as taking into consideration the characteristics of workers to receive training (in particular age). The actual length of training programs is highly variable; therefore, the one year training program assumed in the baseline is arbitrary. In the baseline, unskilled workers would choose whether to undergo training; untrained workers will continue to receive unskilled wage rate, trained workers are assumed to start receiving medium skilled wage rate (this assumption will be relaxed). Wages are computed to each skill category with data for the year 2009.

Table 5 shows the expected benefits of training. Panel A of the table shows that in any case for standard discount rates around 3% training is always beneficial, with subsidy equal to zero, even for short-term jobs, but this is not always the case for higher discount rates or shorter term jobs. Panel B of Table 4 shows the expected benefits of training in the case the subsidy is higher than zero ( $\theta=0.10$ ), which makes the benefits from training always positive.

**Table 5 Expected gains from training**

PANEL A: No subsidy		$I_T - I_{NT}$		
$\theta$	$d$	30 years	10 years	5 years
0	0.03	0.21	0.06	0.01
0	0.10	0.07	0.03	-0.01
0	0.50	-0.03	-0.03	-0.03
0	0.90	-0.04	-0.04	-0.04
PANEL B: with subsidy				
$\theta$	$d$	30 years	10 years	5 years
0.1	0.03	0.28	0.13	0.07
0.1	0.10	0.14	0.09	0.06
0.1	0.50	0.04	0.04	0.03
0.1	0.90	0.02	0.02	0.02

Source: Own elaboration.

In the model, a couple of assumptions remain to be relaxed. The prospective trainee will count in his or her computation the skill premium to receive for a better qualification ( $g_1$ ) as well as an improvement in his or her employability probability ( $g_2$ ). In the above computations, these gaps,  $g_1$  and  $g_2$ , have been assumed to be the difference between an unskilled and a medium skilled worker; however, receiving a short training may not produce such dramatic benefits. Therefore, alternative scenarios are designed, assuming other options for both key wedges in the training decision. The target is to explore the slackness in computations in Table 5, that is, trying to determine if the gains of training are not equal to those corresponding to a medium skilled level, which levels would be the thresholds to maintain the training option still attractive.

**Table 6 Training as an option: margins at work**

	A	A1	A2
$g_1$	1.51	1.20	1.51
$g_2$	0.82	0.82	0.67
$I_T - I_{NT}$	0.13	0	0

Source: Own elaboration.

Alternatives are presented in Table 6. The benchmark scenario is A where  $d = 0.03$ , and  $\theta = 0.10$ . The length of training programs is one year, expected working lifespan 10 years, skill premium 1.51 ( $g_1 = w_1/w_2$  computed for 2009), the employability gap is 0.67 ( $g_2 = p_T/p_{NT}$  computed for 2009). Scenario A1 computes the maximum reduction in the wage gap that would still induce individuals to engage in training, whereas scenario A2 computes the maximum reduction in the probability of employability to still be interested in undergoing training. Table 5 shows that even a skill premium of 20% instead 51% (other factors equal) will still make training attractive; similarly a gain in probability of employability of 67% instead 82% (other factors equal) would still make training courses attractive. At least in the case of Uruguay only a small subset of the available programs could generate such benefits, for instance, only occasionally a course would allow the worker to take up a job with a salary 20% higher after training (without considering the employability gap).

## **IV Conclusions**

This article discusses training decisions for unskilled workers based on a scheme that considers the wage gap and the probability of employability gap pre- and post training, taking the gains from these two elements as the key to the decision. This approach is applied to the Uruguayan case, and given the observed low participation in public training programs, the possible hypothesis could be: 1) public provision is rationed; 2) the benefits of available training programs are low, 3) unskilled workers are too anxious, therefore, strong(er) incentives would be needed.

The results suggest as likely the hypothesis that public training provision is not attractive enough to unskilled workers because of the limited benefits reported to potential trainees, even discounting for cash incentives to participate, which may help to explain the scarce interest in participation in public programs, although other explanations are not ruled out. In particular, considering Becker and Mulligan's (1997) discussion on time preferences, impatience cannot be ruled out as an important disincentive factor for engaging in training.

A long-term policy recommendation that seems to arise is to strengthen basic education as education and training seem complementary rather than substitutes, in the line with what has been suggested by Heckman and Masterov (2004), and Labarca (1998), among others. Other relevant aspects of training and/or contingency plans referring to genre, regional development, or minority groups have been left out the scope of the article.

## References

- Beauchemin, K. (2001). Growth or stagnation? The role of public Education. *Journal of Development Economics*, Vol. 64, pp. 389–416.
- Becker, G., and Mulligan, C. (1997). The endogenous determination of time preference. *The Quarterly Journal of Economics*, Vol. 112, issue 3, pp. 729–758.
- Becker, G. (1962). Investment in Human Capital: A Theoretical Analysis. *Journal of Political Economy*, Vol. 70, No.5, parte 2, pp. 9–49.
- Ben-Porath, Y. (1967). The Production of Human Capital and the Life Cycle of Earnings. *Journal of Political Economy*, Vol. 75, pp. 352–365.
- Comay, Y., Melnik, A.; and Pollatschek, M. (1976). Dropout risks, option values and returns to investment in schooling. *Canadian Journal of Economics*, Vol. IX, No. 1, pp. 45–56.
- Courty, P. and Marschke, G. (2007). Making Government Accountable: Lessons from a Federal Job Training Program. *Public Administration Review*, September – October 2007, pp. 904–916.
- Courty, P. and Marschke, G. (2003). Performance Funding in Federal Agencies: A Case Study of a Federal Job Training Program. *Public Budgeting & Finance*, Fall 2003, pp. 22–48.
- Courty, P. and G. Marschke (1997). Measuring government performance: lessons from a Federal Job-Training Program. *The American Economic Review Papers and Proceedings*, Vol. 87, Issue 2, pp. 383–388.
- De Fraja, G. (2005). Market and Public Provision in the Presence of Human Capital Externalities. CEPR Discussion Papers 5471.
- Dmitrijeva, J. and Hazans, M. (2007) A Stock–Flow Matching Approach to Evaluation of Public Training Programme in a High Unemployment Environment. *Labour*, Vol. 21, No. 3, pp. 503–540.

- Eckstein, Z. and Wolpin, K. (1999). Why youth drop out of high school: the impact of preferences, opportunities and abilities. *Econometrica*, Vol. 67, No. 6, pp. 1295–1335.
- Greenberg, D; Michalopoulos, C; and Robins, P. (2004). What Happens to the Effects of Government-Funded Training Programs over Time? *The Journal of Human Resources*, Vol. 39, No. 1, pp. 277–293.
- Greenberg, D; Michalopoulos, C; and Robins, P. (2003). A Meta-Analysis of Government-Sponsored Training Programs. *Industrial and Labor Relations Review*, Vol. 57, No. 1, pp. 31–53.
- Heckman, J. and Masterov, D. (2004). Skill Policies for Scotland. The Allander Series.
- INE (2006). Encuesta Continua de Hogares de 2006. Encuesta Nacional de Hogares Ampliada (ENHA).
- Koshal, R.; Koshal, B. and Marino, B. (1995). High school dropouts: a case of negatively sloping supply and positively sloping demand curves. *Applied Economics*, Vol. 27, pp. 751–757.
- Labarca, G. (1998). Education in Basic Skills and Training for Productive Work. *International Review of Education*, Vol. 44, No. 5/6, pp. 413–439.
- LaLonde, R. (1995): The Promise of Public Sector-Sponsored Training Programs. *The Journal of Economic Perspectives*, Vol. 9, No. 2, pp. 149–168.
- Manski, C. (1989). Schooling as experimentation: a reappraisal of the post-secondary dropout phenomenon. *Economics of Education Review*, Vol. 8, No. 4, pp. 305–312.
- OECD, ILO, WORLD BANK, WTO (2010). Seizing the benefits of trade for employment and growth. Final report G-20 Summit Meeting, Seoul, Korea, 11–12 November 2010.
- Oreopoulos, P. (2003). Do dropouts drop out too soon? International evidence from changes in school-leaving laws. NBER Working Paper No. 10155.
- PNUD (2005). Desarrollo humano en Uruguay 2005. El Uruguay hacia una estrategia de desarrollo basada en el conocimiento. Printed by Mastergraf, Uruguay.

- Poterba, J (1994). Government intervention in the markets for education and health care: how and why? NBER Working Paper Series, No. 4916.
- Sims, R. (1993). Evaluation Public sector programs. *Public Personnel Management*, Vol. 22, No. 4, pp. 591–615.
- Thomas, W., D. Webber and F. Walton (2002). The School Leaving Intentions at the Age of Sixteen: Evidence from a Multicultural City Environment. *Economic Issues*, Vol. 7, part 1, pp. 1–14.
- Trostel, P. (2002). Should education be publicly provided? *Bulletin of Economic Research*, Vol. 54, No.4, pp. 373–391.
- Vaillant, M; Casacuberta, C.; Forteza, A.; and Siandra, E. (2009). Restricciones al crecimiento en Uruguay: una aplicación del GDM.