

## **Rates of Return on Investments in Apprenticeships: Summary of the Empirical Evidence**

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### **--General Background**

Three different groups typically invest in apprenticeships: (1) the apprentices; (2) the firms or organizations sponsoring the apprenticeships; and, (3) various governmental units. Hence, one can compute a separate rate of return (ROI) for each in terms of the investments they make in apprenticeships.

Nearly all of the credible, rigorous economic evidence on the rate of return on investment (ROI) in apprenticeships comes from Europe (especially the U.K.) and Australia, where apprenticeships have been much more common than in the U.S. European studies have been stimulated by significant government investments in apprenticeship programs. As might be expected, rather quickly the governments demanded to know if their considerable investments have been worthwhile.

Because European governments often backstop the costs of apprenticeship programs with public funds, this usually means that the individual firm sponsoring apprenticeship programs does not have to invest quite as much company money in those programs. This provides a slight upward bias in the computed ROIs on business investments in apprenticeships.

### **--The ROI to Apprentices**

While apprentices typically do invest in their own apprenticeships (for example, by forfeiting the income they could have earned in their next best alternative job), their investments typically are minimal. The major reason for this is that the apprentice is paid a wage (often times a very competitive wage) while he/she is doing his/her apprenticeship. Therefore, costs to the apprentice are low and therefore ROIs enjoyed by individual apprentices typically are very robust.

An excellent summary of recent apprenticeship ROI research has been compiled by the Institute for Employment Research at the University of Warwick in the U.K.<sup>1</sup> However, rather than rates of return, this research summary cites apprenticeships earnings premiums (the amount apprentices are paid in excess of comparable individuals without apprenticeships). These premiums typically ranged from a low of 8 percent to a high of 22 percent, with the higher percentages usually reflecting a longer and more advanced apprenticeship. A broader summary of apprenticeship ROIs focusing on Western Europe has documented similar wage premiums.<sup>2</sup>

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<sup>1</sup> *Review of Apprenticeship Research: A Summary of Research Published Since 2010*, Institute for Employment Research University of Warwick, U.K. (July 2012).

<sup>2</sup> See Samuel Muehlemann and Stefan C. Wolter, *Return on investment of apprenticeship systems for enterprises:*

These earnings premiums translate to *very high ROIs* because the apprentices are not incurring significant investment costs during their apprenticeships. A simple example provided below demonstrates this. Suppose that an apprentice that has successfully completed her apprenticeship program subsequently earns a 15 percent wage premium over a non-apprenticed worker. In our example, assume that this means she earns \$46,000 rather than only \$40,000. If she had to invest say, \$3,000 per year on her apprenticeship for four years, then by her tenth year (her sixth year of post-apprenticeship employment), she will already have realized a 25.6 percent ROI on the investment she made in her first four years. This assumes a 3.72 percent rate of discount is applied to both costs and benefits. This discount rate is very close to the 30-year U.S. Government bond rate today.

However, it's all gravy for our apprentice thereafter---zero costs and very positive benefits. **The moral to the story is that apprenticeships typically turn out to be superb investments for individual apprentices---if they complete them.** Dockery *et al.*, for example, computed an ROI of 46.2 percent for individuals' investments in their own apprenticeships in Australia.<sup>3</sup>

<b>Simple Private ROI Example for Apprenticeship</b>		
<b>Year</b>	<b>Net Gain or Loss</b>	<b>Present Value at 25.6%</b>
1	-\$3,000	-\$2,389
2	-\$3,000	-\$1,902
3	-\$3,000	-\$1,514
4	-\$3,000	-\$1,205
5	\$6,000	\$1,920
6	\$6,000	\$1,525
7	\$6,000	\$1,217
8	\$6,000	\$969
9	\$6,000	\$771
10	\$6,000	\$614
<b>Totals</b>	<b>\$24,000</b>	<b>\$6</b>

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*Evidence from cost-benefit analyses :Analytical Report for the European Commission*, prepared by the European Expert Network on Economics of Education (EENEE), October 2013.

<sup>3</sup> A.M. Dockery, Keith Norris and Thorsten Stromback, "The Social Return to Apprenticeship Training," *The Australian Economic Review*, 31 (1), 1998, 37-46/

## **--The ROI to Business Firms That Sponsor Apprenticeships**

Computing an ROI for the investments that business firms make in apprenticeships is more complex than is true for individuals. Businesses often must invest heavily in the education and training of their apprenticeships; however, the weight of evidence supports the notion that the typical business soon begins to receive value in return. Usually this is true because the apprentice quickly is put “on line” and he/she begins to do a real job.

But, there are other benefits that firms realize from their apprenticeship programs, including:

- Reduced recruiting costs
- A more predictable and reliable supply of skilled labor
- Improved employee retention<sup>4</sup>
- Improved employee productivity

How significant each of these factors actually is depends heavily upon the nature of the apprenticeship occupation, external labor market conditions, and the sponsoring firm itself.<sup>5</sup> **Even so, existing studies suggest that the payback period for a firm sponsoring a typical apprenticeship in the U.K. is only three years for construction apprenticeships and only four years for engineering apprenticeships. In low-cost business sector such as retailing and hospitality, somewhat longer payback periods appear to apply.**<sup>6</sup>

Suppose, however, that a four-year payback period applies to the typical apprenticeship. The simple example below provides hypothetical numbers that might confront a typical firm in such a situation. In the example below, the firm expends \$10,000 per year on the apprenticeship, but only realizes \$5,200 in increased value from the apprentice in the first year. Hence, financially speaking, the apprentice is a net drag on the firm in the first year (and the second year as well). This changes in years three and four, where benefits clearly exceed costs. In this example, I have discounted both the costs and the benefits at 12.0 percent, a discount rate typical of a firm that faces a dynamic market characterized by changing demand and supply conditions and risk.

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<sup>4</sup> The evidence on this issue is mixed. See Samuel Muehleemann and Stefan C. Wolter, European Expert Network on Economics of Education (EENEE), *EENEE Analytical Report No. 16*, Prepared for the European Commission, October 2013.

<sup>5</sup> Muehleemann and Wolter, October 2013, discuss many of these issues in detail and survey the available evidence.

<sup>6</sup> See the *Review of Apprenticeship Research: A Summary of Research Published Since 2010*, p. 60.

<u>Simple Business Firm Example of ROI on Its Investment</u>				
	<u>Cost of</u>		<u>Increased</u>	
	<u>Apprenticeship</u>	<u>Present Value</u>	<u>Value of</u>	<u>Present Value</u>
	<u>to Business</u>	<u>at</u>	<u>Apprentice</u>	<u>at</u>
	<u>Firm</u>	<u>12.00%</u>	<u>to Firm</u>	<u>12.00%</u>
<b>1</b>	<b>\$10,000</b>	<b>\$8,929</b>	<b>\$5,200</b>	<b>\$4,643</b>
<b>2</b>	<b>\$10,000</b>	<b>\$7,972</b>	<b>\$8,700</b>	<b>\$6,936</b>
<b>3</b>	<b>\$10,000</b>	<b>\$7,118</b>	<b>\$12,200</b>	<b>\$8,684</b>
<b>4</b>	<b>\$10,000</b>	<b>\$6,355</b>	<b>\$15,900</b>	<b>\$10,105</b>
	<b>\$40,000</b>	<b>\$30,373</b>	<b>\$42,000</b>	<b>\$30,367</b>

Using the same general analytical approach, one could compute a rate of return (ROI) on the firm’s investment in an individual apprentice, assuming that one could attach realistic numbers to items such as reduced recruiting costs. This usually is accomplished by comparing recruiting costs in apprenticed occupations to those that are not apprenticed, or retention rates in apprenticed job classifications with those in non-apprenticed occupations, etc. It also would be necessary to examine the career profiles of apprentices and non-apprentices in order to assign appropriate value to apprenticeships.

In any case, studies in the U.K. that have focused on the ROI realized by business firms that invest in apprenticeships nearly always find that apprenticeships are a good investment, even after the financial flows are discounted properly over time.<sup>7</sup> **These business firm ROIs, however, are not nearly as high as the ROIs that individual apprentices enjoy, though usually they still range from 5 to 25 percent.**

**--The ROIs That Accrue to Society at Large from Apprenticeships**

The essence of a “social rate of return” (a social ROI) is that such an ROI takes into all costs and benefits that are generated by an apprenticeship, plus all ripple effects, wherever they are realized and by whomever they are realized. On the cost side, in addition to the costs incurred by the apprentices and their sponsoring firms, there may be the costs of direct government subsidies to apprenticeship programs, regulatory costs, and the like. On the benefits side, apprenticeships could generate increased tax payments, reduce financial demands on social services, lower crime rates, etc. Almost needless to say, it’s often a question not only of what one should count as costs and benefits, but also figuring out how to measure those costs and benefits accurately.

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<sup>7</sup> See the *Review of Apprenticeship Research: A Summary of Research Published Since 2010*, p. 61 and Dockery *et al.*, p. 39.

These caveats in mind, a series of studies have found very attractive social ROIs for apprenticeships. These ROIs have ranged from approximately 10 percent to about 33 percent, though these computations have been based upon comparatively low rates of discount, for example, 2.5 percent. The opportunity cost of public funds is higher than this; that is, public funds can be used more productively than 2.5 percent. When more realistic rates of discount such as 5 to 7 percent are chosen, then the social ROIs just noted are cut more by more than one-half. Still, even 5 percent to 15 percent social ROIs are rather attractive.

Note in passing that the ROIs vary dramatically from apprenticeship to apprenticeship, both in terms of the occupations covered and in terms of the firms that sponsor them. There is significant variation in ROIs in practice.

**The bottom line, however, is that social ROIs on public investments in apprenticeships are attractive and frequently exceed the ROIs that governments receive when they invest funds in alternatives such as agricultural subsidies, to say nothing of trade restrictions. ROIs in the range of 5 to 12 percent on public investments in apprenticeship training are commonplace.**