The ROI of **Apprenticeships**

Dr Paul Spear describes the IMI's new econometric model for calculating and illustrating the potential return on investment (ROI) from an automotive technician apprenticeship

This white paper describes a robust model, developed by the Institute of the Motor Industry (IMI), to calculate the potential productivity and return on investment (ROI) from an apprenticeship. This work is the culmination of a two-year research project at the IMI co-funded under the UK Commission for Employment and Skills' second round of Employer Investment Funding (EIF2).

With the current challenges experienced in the after sales market, especially by micro independents, recruiting an apprentice who is keen, possesses a good attitude and can bring new skills into a workshop as part of a business plan for organic business growth is a sensible and measured solution to future recruitment problems.

The strength of the IMI Apprentice ROI model lies in the discovery of the actual way in which apprentice productivity, measured principally by sold hours, changes over time. This has been made possible by the generous participation of a number of micro independents and franchise dealer employers across the four nations who supplied historical and ongoing productivity data from about 30 apprentices and apprentice-trained technicians. The IMI is grateful to the following companies and organisations for their help in this study: AVW, Babcock International Group, Donnelly Group, Phoenix Car Company, PK Automotive Solutions, Remit Group, SF Tebby & Son, Thane and Mears, Trefnant Garage and Wents Service Station.

All apprentice productivity data take the form of a sigmoid S-shaped curve, where low level growth accelerates over time to a self limiting maximum. We are essentially seeing a convolution of increasing apprentice learning and skills (from a low-level skill background) with the availability of increasingly skilled work. Figure 1 shows four such curves demonstrating the variability in productivity profile but highlighting the underlying process of learning and skills growth measured here in terms of sold hours. The sold hours have been normalised (vertical axis) to the average quarterly sold hours of a skilled technician in the same workshop. We've included in Figure 1 the industry 25%, 50%, 75%, 100% 'rule of thumb' of expected apprentice productivity over four years. S-curve 1 represents data supplied by a micro business and S-curves 2, 3 and 4 represent data from franchised dealerships; but the curves can represent productivity for any automotive workshop.

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Figure 1 demonstrates a significant result. An apprentice is teamed with a technician in the first year (and second year). The initial baseline low-skilled productivity in the S-curves is an indication of the increased productivity (and efficiency) that an apprentice can offer a technician willing to take on an apprentice. The 10%-25% productivity contributions shown in the first few quarters of S-curves 2, 3 and 4 are borne out by interviews and a limited study at a micro business of technician productivity when an apprentice alternates between technicians.

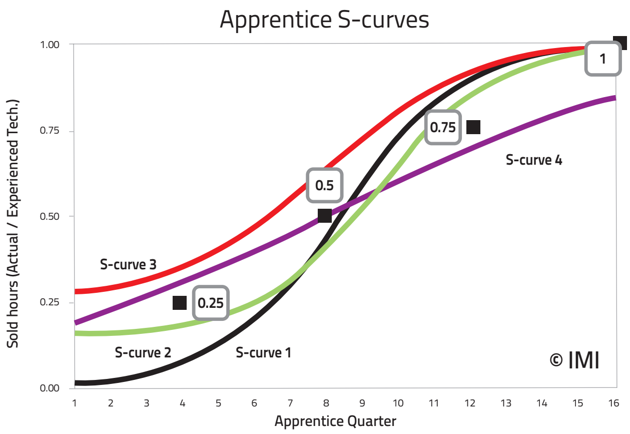

Figure 1

A technician has additional productivity in the form of the net profit on parts sold on the job. We have empirical evidence that suggests, for a charge out rate of £50 per sold hour, the net profit on parts is £10 - £15 per technician sold hour, scalable to the charge out rate. Our illustrations in this paper assume 'fair value' in that if an apprentice works a number of hours to sell one hour then we universally attribute a £10 net profit on parts for that hour. We assume any rework has already been factored into the productivity figures supplied by our partners. The third and final measurable productivity contribution from an apprentice comes from valued 'house-keeping' activities involved in keeping the workshop clean and ordered.

In order to produce a quarterly benefit we need to net out the gross value of the sold hours (calculated from the charge out rate weighted for the relative proportion of retail, warranty and internal work) and additional productivity against full apprentice labour costs, the pro rata full salary costs of the time a skilled technician spends with the apprentice and the proportionate loss in productivity (both estimated at 5% in the first year and 2% in the second year of the apprenticeship). We use the current apprentice hourly national minimum wage (age 16 year 1: £2.68, year 2: £3.72, year 3: £5.03) that smoothly transitions to a fourth year annual salary of £12,000. We assume a skilled technician full salary (including national insurance, pension and bonus) of £24,000.

We do not allow for the principal training costs paid directly to the training provider by the government agency; but we do include estimated amounts for recruitment of the apprentice, basic travel and subsistence during day release to the training provider, administration costs, personal protection equipment, mandatory health and safety training. As we are demonstrating the benefits of an additional member of staff, an apprentice, the effect on overheads is minimal and has therefore not been included in the figures shown in this paper.

Our model allows for, but for the purposes of this paper, assumes zero-rated time value of money and variability in the charge out rate over time. The key phase of an apprenticeship is the first two years; effects from taking net present values on regular quarterly cash flow figures only become noticeable from the third year.

Figure 2 shows the quarterly income netted against salary and employer costs generated by an apprentice according to S-curve 1 for years one to three and the fourth (improver) year combined with the additional productivity discussed earlier. This plot uses an hourly charge out (recovery rate) of £50; by the end of the fourth year the apprentice is producing 325 sold hours per quarter (25 hours per week). As costs exceed productivity for five quarters there is a small net loss over this period (red shading). This is normal within some apprenticeships and is clearly explainable from the shallow S-curve 1 in Figure 1. However, as the apprentice gains knowledge, skills and the confidence of the employer the number of productive jobs increases to a point just after quarter seven (amber shading) where all productivity to data equals all apprentice costs to date (breakeven). Beyond quarter seven, productivity exceeds costs in line with the behaviour of S-curve 1. The net productivity curve (green shading) flattens after quarter 12 in line with the apprentice in this business maximising sold hours at 25 per week (325 per quarter).

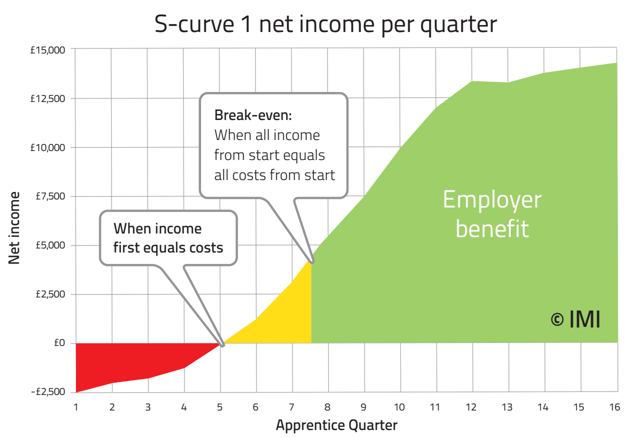

Figure 2

Figure 3 shows a similar plot for S-curve 2 (charge out rate £50 per sold hour and quarter 16 sold hours of 25 per week). As the business is able to sell out low-skilled work against the apprentice in the first four quarters, the apprentice is essentially a net productive by the first/second quarter.

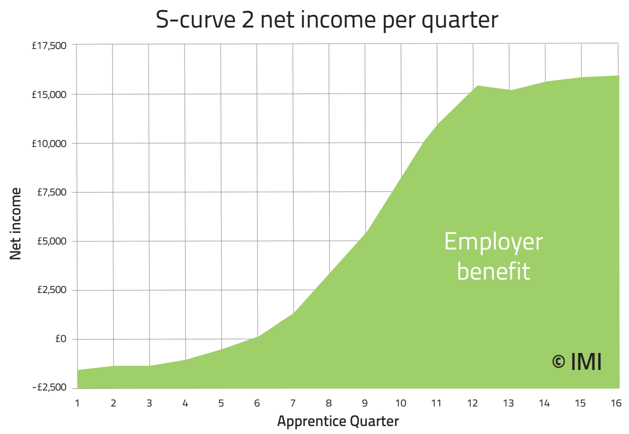

Figure 3

Figure 4 shows the cumulative plot for S-curve 1 including the additional productivity discussed earlier. The breakeven point (referred to in Figure 2) is where the solid curve crosses the horizontal axis. The cumulative net productivity then increases throughout the apprenticeship (and beyond) reaching £51,300 by quarter 12 with a cumulative return on investment of 149%. This means that for each £1 of investment in the apprentice the business has made a return, net of apprentice costs, of £1.49 which, for all expenses, is a total of £51,300.

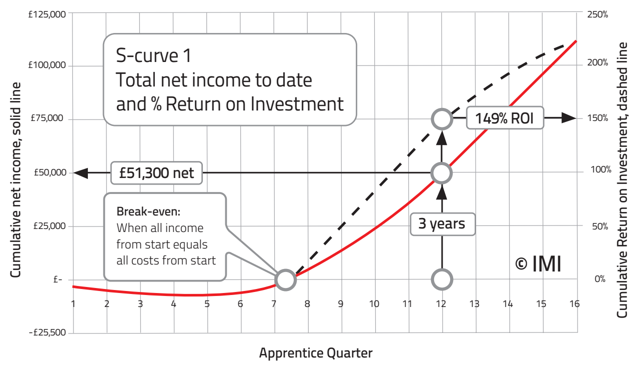

Figure 4

Similarly, **Figure 5** shows plots of cumulative net productivity and return on investment for S-curve 2. There is net productivity from quarter 1, increasing throughout the apprenticeship, and reaches £66,900 by quarter 12 with a cumulative return on investment of 194%. This means that for each £1 of investment in the apprentice the business has made a return, net of apprentice costs, of £1.94 which, for all expenses, is a total of £66,900.

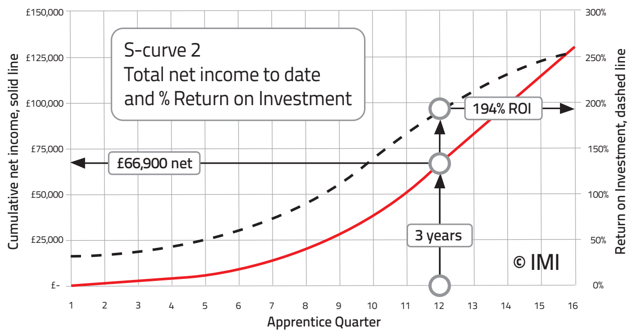

Figure 5

We now bring all this together in **Figure 6**. The left hand table shows the percentage return on investment (net benefit divided by the costs). We give examples for charge out rates of £40, £50, £60 and £70 per sold hour. The right hand table shows the equivalent total net income for the three-year apprenticeship. Note that S-curve 4 shows a reduced productivity and return on investment compared to S-curves 3 and 4 – see Figure 1.

Total % ROI for 3-year Apprenticeship

S-curve:	S1	S2	S3	S4
Recovery rate:	Average end Y3 sold hours: 325 per qtr (25 per week)			
£40/hr	109%	147%	228%	161%
£50/hr	149%	194%	292%	211%
£60/hr	187%	238%	352%	258%
£70/hr	222%	280%	408%	302%

Total net income for 3-year Apprenticeship

S-curve:	S1	S2	S3	S4
Recovery rate:	Average end Y3 sold hours: 325 per qtr (25 per week)			
£40/hr	£35,300	£49,000	£75,800	£53,600
£50/hr	£51,300	£66,900	£100,400	£72,600
£60/hr	£66,400	£84,700	£125,000	£91,600
£70/hr	£81,500	£102,600	£149,500	£110,600

Figure 6

We believe the IMI Apprentice ROI model is a robust calculator of the financial benefit of an automotive apprenticeship. The model has complete flexibility in terms of cost inputs, variable S-curves and parameters of productivity. Our hope is that this model can be used as an effective tool to persuade lapsed employers, employers considering succession of staff nearing retirement or employers new to apprenticeships and planning to expand their service operation to take the next step to discovering the benefits of taking on a keen and ambitious young person.

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