DEMONSTRATING THE VALUE OF THE

Maple Group of Leading Sixth Form Colleges

EXECUTIVE SUMMARY

June 2014

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INTRODUCTION

The Maple Group of Leading Sixth Form Colleges (Maple Group) creates value in many ways. Maple Group member colleges are committed to putting their learners on the path to success and play a key role in helping them increase their employability and achieve their individual potential. With a vast range of courses and apprenticeships, the Group member colleges' provision enables learners to acquire qualifications and develop the skills they need in order to have a fulfilling and prosperous career. Maple Group member colleges also provide an excellent environment for learners to meet new people and make friends, while participation in college courses improves the learners' self-confidence and promotes their mental health. All of these social and employment-related benefits have a positive influence on the health and well-being of individuals.

However, the contribution of the Maple Group consists of so much more than solely influencing the lives of learners. The member colleges' provision supports a range of employment sectors in the Maple Group service region, referred to as England and defined as North West, West Midlands, Yorkshire and the Humber, East, London, South East, East Midlands. While this region does not encompass all of England, it covers the regions and immediately surrounding areas that the colleges are located in. This provision supplies employers with the skilled workers they need to make their businesses more productive. The expenditure of the Maple Group member colleges, along with the spending of their staff and learners, further supports the regional economies through the output and employment generated by regional suppliers. Lastly, and just as importantly, the economic impact of the Maple Group extends as far as the Exchequer in terms of increased tax receipts and decreased public sector costs.

In this report we aim to assess the economic impact of the Maple Group on its key stakeholder groups: learners, society, taxpayers, and the regional communities. The fact that learning makes a difference to these groups is well known, but comparatively little research has been done to quantify the monetary value of the impacts. Some of the more recent studies include Fujiwara's (2012)[1] analysis of the impact of adult learning and the March 2010/11 study commissioned by the Department for Business, Innovation and Skills (BIS)[2] on the economic impact of the FE Sector. Although the approaches used in these and other similar studies vary,

1   Daniel Fujiwara, 'Valuing the Impact of Adult Learning' (National Institute of Adult Continuing Education: Leicester, 2012).
2   Rachel Beaven et al, 'Measuring the Economic Impact of Further Education' (Department for Business, Innovation and Skills, BIS Research Paper Number 38: London, March 2011).

they all contribute valuable information to the growing body of evidence that proves the value of investing in education.

The approach in this study is twofold. We begin with a standard investment analysis to determine how the investments in the Maple Group will perform for a given investor over time. The investors in this case are learners, society, and taxpayers, all of whom pay a certain amount in costs to support the learning activities at Maple Group member colleges. The learners' investment consists of their direct outlays, such as those for tuition fees (for adult learners) and books, plus the opportunity cost of spending time learning opposed to earning income through employment. Society invests in learning by forgoing the services that it would have received had government not funded the Maple Group member colleges and the business output that it would have enjoyed had learners been employed instead of learning. Taxpayers contribute their investment through government funding via organisations such as the Education Funding Agency. In return for these investments, learners receive a lifetime of higher earnings, society benefits from an expanded tax base and a reduced demand for social services, and taxpayers benefit from higher tax receipts and avoided public sector costs. To determine the feasibility of the investment, the model projects benefits into the future, discounts them back to their present value, and compares them to their present value costs. Results of the investment analysis for learners, society, and taxpayers are displayed in the following three ways: 1) net present value of benefits, 2) rate of return, and 3) benefit/cost ratio.

The second component of the study focuses on the economic impacts created by the Maple Group on the business community in their surrounding regions and in England. Economic impact analysis is distinct from investment analysis in that it focuses on a single time period and does not project impacts into the future, nor does it factor in costs incurred by stakeholders. To derive results, we rely on a specialised input-output (IO) model to calculate the additional income created in each region and in England as a result of the increased consumer spending and added skills generated by Maple Group member colleges and their learners. Results of the economic impact analysis are measured in terms of the added income created by the following three effects: 1) impact of staff and member college expenditure, 2) impact of learner expenditure, and 3) impact of the skills acquired by learners still active in England's workforce. While emphasis is placed on the impacts created across England by all of the member colleges, these will be separated out by region in tables later in the analysis.

Data and assumptions used in the study are based on several sources, including the 2012-13 Individual Learner Records (ILR) reports from Maple Group member colleges, industry and employment data from Nomis official labour market statistics, demographic and earnings data from the Office for National Statistics (ONS), and EMSI's input-output model. The study applies a conservative methodology and follows standard practice using only the most recognised indicators of investment effectiveness and economic impact. For more information on the data used to derive the results, we encourage our readers to contact the Maple Group for full documentation of the study.

STUDY HIGHLIGHTS

The results of this study show that the Maple Group has a significant positive impact on its main stakeholder groups: learners, society, taxpayers, and the regional business communities. Using a two-pronged approach that involves an investment analysis and an economic impact analysis, we calculate the benefits to each of these groups. Key findings of the study are as follows:

INVESTMENT ANALYSIS

BENEFITS TO LEARNERS

- Learners as a whole paid a total of **£14.6 million** to cover direct costs such as those for books and supplies, trips, and tuition fees (for adult learners) at Maple Group member colleges in 2012-13. All learners also forwent **£238.1 million** in earnings that they would have generated had they been working instead of learning.

- In return for the monies that learners invest in Maple Group member colleges, they will receive a present value of **£1.6 billion** in increased earnings over their working lives.

- Every £1 that learners pay for their education at Maple Group member colleges yields **£6.20** in higher future wages. This translates to a **16.7%** annual return on their investment.

BENEFITS TO SOCIETY

- Society as a whole invested **£547.1 million** in Maple Group member colleges through direct outlays and the loss of potential output from learners who spent time at the Group's member colleges rather than working.

- In return, society in the UK will receive a present value of

£4.9 billion over the course of the learners' working lives, in the form of an expanded tax base and a variety of social benefits related to reduced crime, lower unemployment, and increased health and well-being.

- Society will receive **£9.00** in benefits in return for every £1 invested in Maple Group member colleges. The average annual return on investment is **23.3%**.

BENEFITS TO TAXPAYERS

- Taxpayers in the UK paid **£100.9 million** to support the operations of Maple Group member colleges in 2012-13.

- The net present value of the added tax revenue stemming from the learners' higher lifetime incomes and the increased output of businesses amounts to **£712.2 million** in benefits to taxpayers. Avoided costs to the public sector adds another **£129.3 million** in benefits due to a reduced demand for government-funded social services in the UK.

- Taxpayers see an average annual return of **22.7%** on their investment in Maple Group member colleges. The corresponding benefit-cost ratio is **£8.30** in benefits returned for every £1 in costs.

ECONOMIC IMPACT ANALYSIS - ENGLAND

IMPACT OF STAFF AND MEMBER COLLEGE EXPENDITURE

- Maple Group member colleges employed a total of **2,465** full-time equivalent (FTE) staff in 2012-13. Staff costs amounted to **£75 million**, much of which was spent in England to purchase groceries, clothing, and other household goods and services.

- The Group's member colleges are buyers of goods and services and spent **£32.8 million** to support their operations in 2012-13. This expenditure further benefited many regional suppliers in England.

- The net impact of all staff and member college expenditures in England comes to approximately **£127.1 million** in added income in the economy each year.

IMPACT OF LEARNER EXPENDITURE

- Maple Group member college learners who relocate to England from outside of the area spend money at local shops to buy books and supplies, purchase groceries, rent accommodation, pay for transport, attend sporting events, etc.

- The expenditure of Maple Group member colleges' non-resident learners annually adds approximately **£179.4 thousand** in income to England's economy.

IMPACT OF ADDED WORKFORCE SKILLS

- Many of the Maple Group member colleges' learners stay in England, either to work or continue on with their education. Their enhanced skills and abilities bolster the output of regional employers, leading to higher income and a more robust economy.

- The accumulated impact of former Maple Group member college learners who are currently employed in the workforce amounts to **£1.9 billion** in added income in England's economy each year.

TOTAL IMPACT ON THE ENGLISH BUSINESS COMMUNITY

- Altogether, the total economic impacts of Maple Group member colleges to the business community in England is **£2.1 billion** each year.

- Total added income created by Maple Group member colleges' learners is equal to **0.2%** of the total economic output of England and represents roughly **72,704** average wage jobs.

METHODOLOGY & RESULTS

The Maple Group member colleges generate a wide array of benefits. Learners benefit from higher lifetime earnings, society and taxpayers benefit from an expanded tax base and avoided social costs, and their regional business communities benefit from increased consumer spending and higher skill levels in the workforce. In this study, the Maple Group investigates the benefits its member colleges create for each of their main stakeholder groups, i.e., learners, society, taxpayers, and their regional business communities. The following two analyses are presented: 1) investment analysis, and 2) economic impact analysis. Benefits to learners, society, and taxpayers fall under the investment analysis, and benefits to the regional business communities fall under the economic impact analysis. The methodology and results for both of these analyses are described more fully below.

INVESTMENT ANALYSIS

Investment analysis is the process of evaluating total costs and measuring these against total benefits to determine whether or not a proposed venture will be profitable. If benefits outweigh costs, then the investment is worthwhile. If costs outweigh benefits, then the investment will lose money and is thus considered unprofitable. In this section, we consider Maple Group member colleges as an investment from the perspectives of learners, society, and taxpayers. The backdrop for the analysis is the entire UK economy.

Benefits to Learners

In 2012-13, Maple Group member colleges served 28,308 unique learners across various qualifications and levels. Table 1 shows the breakdown of enrolments at the Maple Group member colleges by education level, beginning

with entry level up through greater than Level 3. As indicated, the bulk of the member colleges' provision was at Level 3, comprising 85% of all enrolments, followed by Entry Level, which comprised 11% of all enrolments.

In order to go to one of the Maple Group member colleges and depending on their level of funding, learners pay money to cover direct costs such as those for books and supplies, trips, and tuition fees (for the colleges who serve adult learners). All learners also forgo earnings that they would have generated had they been working instead of learning. Together these two cost factors comprise the learners' total investment in their education at the Maple Group member colleges, equal to £252.6 million in 2012-13 (the sum of £14.6

TABLE 1. Breakdown of enrolments at Maple Group member colleges, 2012-13

EDUCATION LEVEL	%
Entry Level	11%
Level 1	2%
Level 2	1%
Level 3	85%
> Level 3	<1%
Total	**100%**

Source: Data supplied by Maple Group member colleges.

FIGURE 1. Unemployment rate and average annual earnings by education level received by individuals in England at the midpoint of their career
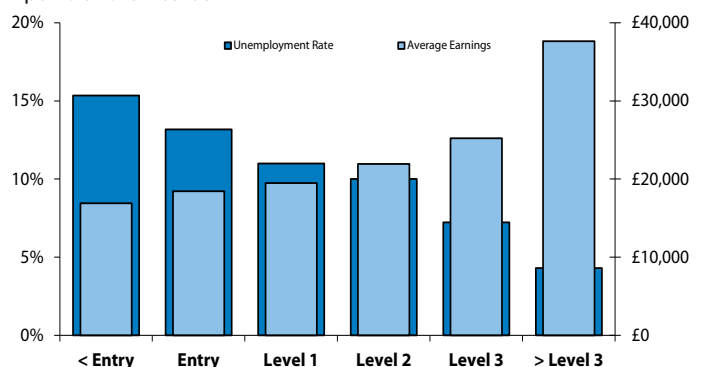
million in books and supplies, trips, tuition and other direct costs, and £238.1 million in forgone earnings). This translates to an average cost of £8,925 per learner, the bulk of which comprises the opportunity cost of spending time learning rather than working.

In return for the costs of education, learners receive a stream of higher future earnings that continues to grow throughout their working lives. As shown in Figure 1, mean income levels received by average-aged workers at the midpoint of their career increase as individuals attain higher levels of education. Employment prospects also increase, so unemployment levels decrease as learners gain higher education levels. Table 2 shows the average lifetime earnings that learners can expect to receive at each education level.

The marginal differences between education levels form the basis for determining the earnings benefits that accrue to learners in return for their education investment. For example, the average Level 3 achiever from a Maple Group member college will see an increase in earnings of £3,305 each year compared to someone with Level 2 qualifications. This amounts to a present value of approximately £148,727 in higher earnings over a working lifetime.

To calculate the learners' return on investment, we use the differences in wages to attach a monetary value to the learners' achievement level at the Maple Group member colleges in 2012-13. We then project this earnings increase into the future over the course of the learners' working career by applying the well-known human capital earnings function developed by Jacob Mincer, where earnings gradually increase from the time learners enter the workforce, come to a peak shortly

after the career midpoint, and then dampen slightly as learners approach retirement. The result is a stream of projected future benefits tailored to the learners' specific achievement levels at the Maple Group member colleges.

The final step is to discount the stream of future earnings to the present in order to account for the time value of money. For the learner perspective we assume a discount rate of 3.5%. The present value of the benefits is then compared to the costs that learners pay for their education (i.e., direct costs and forgone earnings) to derive the investment analysis results, expressed in terms of a net present value, benefit/cost ratio, and rate of return. Results appear in Table 3.

As shown in the table, the present value of the higher future earnings that accrue to learners yields a cumulative sum of £1.6 billion. Costs are provided in the second row of Table 3, equal to £252.6 million, which includes direct costs and the opportunity cost of time. By dividing the £1.6 billion in benefits by the £252.6 million in costs, we derive a benefit-cost ratio of 6.2. This means that, for every £1 learners invest in the Maple Group member colleges in the form of direct costs and forgone earnings, they will receive a cumulative £6.20 in higher future earnings over the course of their working life. Recall that the bulk of the learners' investment comprises their opportunity cost, so even if they spend little to no money on tuition fees or other direct costs, this does not necessarily mean that their returns will also have a correspondingly small value.

The rate of return is perhaps the most recognised indicator of investment effectiveness. Given the cost of education and the stream of associated future benefits, the rate of return indicates how much a bank would have to pay a depositor of like amount to yield an equally rewarding stream of future payments. Table 3 shows the Maple Group member colleges' learners earning an average annual rate of return of 16.7% on their investment of time and money. This is an impressive return compared, for example, to the less than 3% return per annum that can be expected from saving money in today's Individual Savings Accounts (ISAs).

TABLE 2. Average lifetime earnings by education level received in England, undiscounted

EDUCATION LEVEL	EARNINGS	DIFFERENCE
< Entry level	£760,218	n/a
Entry	£829,398	£69,180
Level 1	£877,093	£47,695
Level 2	£986,535	£109,443
Level 3	£1,135,262	£148,727
> Level 3	£1,693,670	£558,408

Source: Derived from data supplied by ONS. Figures are weighted according to the specific gender and ethnicity profile of the Maple Group member colleges' learner population.

TABLE 3. Present value of benefits and costs, learner perspective (£ thousands)

A. Present value of future earnings stream	£1,564,439
B. Present value of learner costs	£252,646
Net present value (A – B)	**£1,311,792**
Benefit/cost ratio (A / B)	6.2
Rate of return	16.7%

Source: EMSI.

Benefits to Society

Maple Group member colleges are in many ways social enterprises. They aim to improve the lives of young people by increasing their employability and raising their individual potential. They help to create shared wealth in the UK economy through the higher incomes of learners and the increased output of businesses. Further, they tackle social problems such as crime, unemployment, and poor lifestyle habits by positively influencing the health and well-being of their learners.

From the perspective of society, the social value created by Maple Group member colleges takes on two forms. The first and largest component is the added income created in the UK. As discussed in the previous section, learners earn more because of the skills and qualifications they acquire while attending the Maple Group member colleges. Businesses also earn more because the enhanced skills of learners make capital more productive (i.e., buildings, machinery, and everything else). This in turn raises profits and other business property income throughout the national economy. Together, increases in earnings and business output stimulate corresponding increases in value added, thereby raising prosperity in the UK and expanding the tax base for society as a whole.

Maple Group member colleges' social value also consists of the savings that accrue to society through the improved lifestyles of learners. Learning is statistically correlated with a variety of life changes that generate social savings in three main categories: 1) health, 2) crime, and 3) unemployment. Health savings include avoided medical costs associated with smoking, obesity, and mental disorders. Crime savings consist of reduced security expenditure and insurance administration, lower victim costs, and reduced Criminal Justice System expenditures. Unemployment savings comprise the reduced demand for income assistance and Jobseeker's Allowance benefits. By combining data sets that relate learning to improved social behaviour, we are able to quantify how education contributes to the lowering of social costs and ultimately improves quality of life.

Table 4 shows the present value of the added income and social savings that occur in the UK over the working lifetime of the Maple Group member colleges' learners. As shown, added income amounts to a present value of £4.6 billion, due to the increased lifetime earnings of learners and associated increases in business output. Social savings amount to £277.2 million, the sum of health, crime, and unemployment savings in the UK (see also Figure 2). Altogether, the total social value of the Maple Group member colleges is £4.9 billion. Note that the figures in Table 4 have been adjusted to account for counterfactual outcomes where the Maple Group member colleges do not exist.

In order to calculate society's return on investment, we must first determine what it cost society to support Maple Group member colleges during the reporting year. Costs to society break down into two main categories, direct outlays and opportunity costs. Direct outlays to Maple Group member colleges simply refer to their operating and non-operating revenues, equal to £111 million in 2012-13. Opportunity costs refer to

the loss of earnings and output that would have been generated in the UK economy had learners chosen to work full-time rather than learning. Opportunity costs also include the government services that would have been undertaken had taxes been collected on the incomes that learners forgo. Together direct outlays and opportunity costs equal £547.1 million in costs to society during the reporting year.

Table 5 shows the investment analysis results. In return for the £547.1 million that society invests in Maple Group member colleges, it receives a net gain (in present value terms) of £4.4 billion. The associated benefit-cost ratio is £9.00 for every £1 spent, and the

TABLE 4. Present value of added income and social savings that accrue to society (£ thousands)

	TOTAL
ADDED INCOME	
Increased income in the UK	£4,645,478
SOCIAL SAVINGS	
Health savings[*]	£56,625
Crime savings	£198,808
Unemployment savings[†]	£21,764
Total	**£4,922,674**

[*] Includes savings from reduced smoking, obesity, and mental disorders.
[†] Includes savings from a reduced number of JSA claimants.
Source: EMSI.

FIGURE 2. Present value health, crime, and unemployment savings to society (£ thousands)
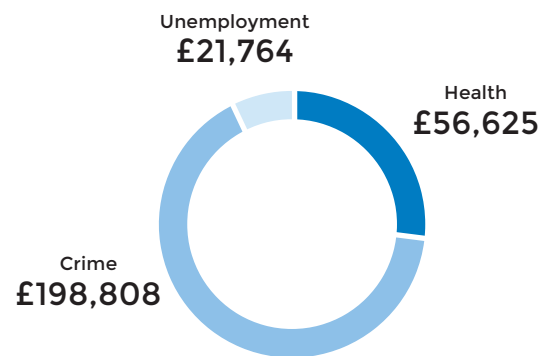
TABLE 5. Present value of benefits and costs, social perspective (£ thousands)

A. Present value of social benefits	£4,922,674
B. Present value of social costs	£547,139
Net present value (A – B)	**£4,375,535**
Benefit/cost ratio (A / B)	9.0
Rate of return	23.3%

Source: EMSI.

average return on investment is 23.3% annually.

Benefits to Taxpayers

Benefits and costs under the taxpayer perspective only look at the monetary gains and losses that accrue to the public sector as a result of the Maple Group member colleges. Learners earn more, which means they make higher income tax payments and National Insurance contributions. The portion of their higher earnings that learners spend also leads to higher value added tax (VAT) receipts. Further, as employers increase their output and make more purchases for supplies and services, they benefit the Exchequer through their higher corporation tax and VAT payments. Altogether, the present value of the added tax receipts that accrues to taxpayers amounts to £712.2 million.

A portion of the social savings enjoyed by society also accrues strictly to taxpayers. As learners become more employable, the demand for Jobseekers' Allowance benefits reduces. Learners put less of a demand on the National Health Service (NHS) for medical treatment as a result of their improved health habits. Further, the reduced probability that learners will commit criminal offences leads to a reduced demand on the Criminal Justice System for law enforcement services. Figure 3 illustrates in present value terms how the £277.2 million in health, crime, and unemployment savings to society translates to £129.3 million in savings to taxpayers. These represent the monies that taxpayers

TABLE 6. Present value of benefits and costs, taxpayer perspective (£ thousands)

A. Present value of taxpayer benefits	£841,524
B. Present value of taxpayer costs	£100,855
Net present value (A – B)	**£740,669**
Benefit/cost ratio (A / B)	8.3
Rate of return	22.7%

Source: EMSI.

FIGURE 3. Present value savings to society and associated savings to taxpayers

do not have to spend as a result of the reduced demand for government-supported social services.

Summing the present value of the added tax revenues and savings to taxpayers yields £841.5 million (net of the same counterfactual adjustment applied to the social perspective). This value appears in the top row of Table 6. Also shown in the table are the costs to taxpayers, equal to £100.9 million. These represent the total funding received by Maple Group member colleges from taxpayers in 2012-13.

By comparing taxpayer costs to the £841.5 million in benefits, we derive a benefit/cost ratio of 8.3. This means that for every £1 of public money invested in the Maple Group member colleges, taxpayers receive a cumulative value of £8.30 over the course of the learners' working lives. This translates to a 22.7% annual return on investment to taxpayers for their support of Maple Group member colleges, again a solid investment that compares favourably with other long-term investments in both the private and public sectors.

ECONOMIC IMPACT ANALYSIS - ENGLAND

The Maple Group promotes economic growth in England in a variety of ways. Each member college is an employer and a buyer of goods and services, while the living expenses of learners from outside of England benefit regional businesses. In addition, the Maple Group member colleges serve as a primary source of education to residents and suppliers of trained workers to industry.
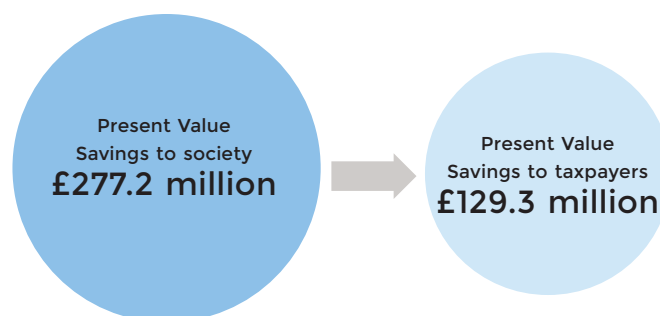
Unlike the investment analysis which focused on the benefits the Maple Group colleges create across the entire UK, in this section we examine the economic impacts of the Maple Group member colleges on the regional business community each are located in. These impacts are created through the increased consumer spending and enhanced business productivity generated by the member colleges and their learners. The impacts reflect the economic relationships among each regions' and England's industries and are calculated using EMSI's proprietary input-output (IO) model. The model places particular reference on how much each industry purchases from every other industry by using NUTS3 (county and unitary authority level) area data from the Office for National Statistics' (ONS) Supply and Use Tables (SUTs), as well as regional and national industry jobs totals and national sales-to-jobs ratios. The results are then expressed in terms of income (as opposed to sales) in order to present a more accurate picture of the Group's actual impacts by accounting for

monies that leave the economy.

The following pages present the results of the analysis broken down by region and as a whole across the group according to the following three effects: 1) impact of staff and member college expenditure, 2) impact of the expenditure of learners who relocate to the individual regions to attend one of the member colleges, and 3) impact of the added skills of former Maple Group member college learners who study or are employed in each region's workforce. Results across England are also shown, although it must be noted that these are not simply the sum of each region's impacts, but rather represent the unique impacts and knock-on effects of the member colleges across England.

The regions with their respective institutions are broken down as follows:

- *East of England Region:* Hills Road Sixth Form College
- *North West Region:* Cardinal Newman College, Holy Cross College, Sir John Deane's College and Winstanley College
- *South East and London Region:* Peter Symonds College, St. Dominic's Sixth Form College and The Sixth Form College Farnborough
- *West Midlands Region:* King Edward VI College
- *Yorkshire and the Humber Region:* Greenhead College

Impact of Staff and Member College Expenditure

Each Maple Group member college is an important employer in England, providing jobs for a wide range of staff across a number of occupations. In 2012-13, the member colleges employed full-time and part-time staff equivalent to 2,465 full-time employees. Of these, all were England residents. Total staff costs at Maple Group member colleges in 2012-13 amounted to £75 million, which became part of England's overall income. Staff expenditure on groceries, eating out, clothing, and other household costs also helped support regional shops and businesses.

In addition to their staff, the Maple Group member colleges are large-scale buyers of goods and services. As a whole in 2012-13, the member colleges spent £32.8 million to support their operations. Much of this expenditure benefited regional suppliers in England, creating a knock-on effect that generated additional employment and income throughout the economy.

The impact of Maple Group member colleges' payroll and purchases is subdivided into the following two main effects: the direct effect and the indirect effect. The direct effect comprises the member colleges' payroll and employee benefits, less monies paid to individuals working outside the regions. The indirect effect refers to the additional income created in the economy as Maple Group member colleges' employees and suppliers spend money in the regions to purchase even more supplies and services.

To calculate the indirect effect, we remove any expenditures that occur outside of the regions and map the remainder to the 19 top-level industry sectors of the IO model. We then run the data through the model's knock-on matrix to estimate how the spending of the member colleges and their staff affects the output of other industries in the area. Finally, we convert the sales figures to income by means of value added-to-sales ratios, also provided by the IO model. Table 7 shows the results for the Maple Group colleges as a whole, a total of £175.4 million in gross impacts attributable to the direct effect of staff costs plus the indirect effect that occurs as the member colleges and their staff spend money in England.

One adjustment must be made to the gross impact before deriving the net impact of staff and member college expenditure. Maple Group member colleges received an estimated 51.9% of funding from regional sources, whether from regional residents (in the form of tuition fees) or from other private and public sources located in England. Given this phenomenon, a portion of the income that the member colleges create in England's economy is offset by the income that they withdraw from the economy. As such, not all of the impacts generated by the Maple Group member colleges and their staff can be considered new monies brought to the regions.

TABLE 7. Total Maple Group impact in England of staff and member college expenditure (£ thousands)

	TOTAL
Total income in the region	**£1,036,318,592**
Direct effect of staff costs	£75,032
Indirect effect	£100,412
Gross total	**£175,443**
Alternative use of funds adjustment	-£48,308
Net total	**£127,136**

Source: EMSI.

TABLE 8. Impact of staff and member college expenditure by region (£ thousands)

	TOTAL
Net impact per region	
East of England Region	£12,988
North West Region	£44,763
South East and London Region	£47,575
West Midlands Region	£9,672
Yorkshire and the Humber Region	£12,432
Maple Group total	£127,136

Source: EMSI.

To determine the 'net' impact of Maple Group member college payroll and purchases, we take the estimated portion of funding that originated from regional sources and convert it to spending. We then bridge the spending figures to the individual sectors of the IO model, calculate the knock-on effect, and convert the amounts to income. The result, equal to £48.3 million, allows us to see what income would have been created in England anyway, even if the Maple Group member colleges did not exist.

Subtracting the £48.3 million in alternative uses of funds from the £175.4 million in gross impacts yields a net impact of £127.1 million in added income for the Maple Group colleges as a whole in the English economy. This value appears in the bottom row of Table 7.

Table 8 shows the added income due to staff and college expenditure for each region. Again, the sum of the individual regions does not equal the total £127.1 million due to differences in knock-on effects and other factors across England compared to the individual regions. Assuming that the Maple Group member colleges employ approximately the same number of people and spend approximately the same amount each year, these values may be considered annual figures.

Impact of Learner Expenditure

Learners who relocate to England to attend one of the Maple Group member colleges (namely international learners) spend money at regional shops to buy books and supplies, purchase groceries, rent accommodation, pay for transport, attend sporting events, and so on. The expenditures of Maple Group member colleges' non-resident learners support regional suppliers and create knock-on effects, thereby generating income and a need for further jobs.

In order to calculate the knock-on effects of non-resident learners, we begin by estimating their gross expenditure in 2012-13, a total across all colleges of £198.7 thousand. Note that we exclude the expenses of in-commuters since they spend little in England compared to those who live in the regions. We then calculate the direct effect by mapping the £198.7 thousand in sales to the industry sectors in the IO model, adjusting them to account for leakage, and converting them to income by applying value added-to-sales ratios.

The indirect effect comprises the additional income created as the businesses that benefit from the Maple Group member colleges' non-resident learners also spend money in the regions. We derive this effect by running the same £198.7 thousand in sales (net of leakage) through the knock-on matrix and applying value added-to-sales ratios from the IO model to convert the results

TABLE 9. Total Maple Group impact in England of expenditure of non-resident learners (£ thousands)

	TOTAL
Total income in the region	**£1,036,318,592**
Direct effect of learner expenditure	£96
Indirect effect	£84
Total	**£179**

Source: EMSI.

TABLE 10. Impact of expenditure of non-resident learners by region (£ thousands)

	TOTAL
Net impact per region	
East of England Region	£0
North West Region	£38
South East and London Region	£111
West Midlands Region	£0
Yorkshire and the Humber Region	£0
Maple Group total	£179

Source: EMSI.

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to income.

Summing together the direct and indirect effect, we estimate that the spending of the Maple Group member colleges' non-resident learners annually adds approximately £179.4 thousand in income to England's economy. Since we are capturing the impacts of only international learners who relocate to the regions (thereby injecting new monies into the regions), we do not have to adjust for the alternative use of funds as we did for the staff and member college expenditure in the previous section. All of the results leading to this impact are presented in Table 9 for the Maple Group colleges as a whole, and separated out by region in Table 10.

Impact of Added Workforce Skills

The Maple Group's strong focus on higher education and workforce development manifests itself at all levels of the member colleges' provision. In addition to delivering specific training and consultancy solutions to businesses, the member colleges maintain close links with higher education institutions and regional employers in order to target the type of employee training that best meets their growth strategies. All of these services provide valuable resources to businesses and help develop the skills of the existing England labour force.

Employee training and development is just one way that employers benefit from the presence of the Maple Group member colleges. By working with higher education institutions in preparing learners for additional levels of training and development, as well as aligning their provision with key employment sectors in the regions in terms of the skills employers will require

TABLE 11. Maple Group member colleges' breakdown of instructional activity by subject sector

SECTOR SUBJECT AREA	% OF TOTAL
Science and Mathematics	37%
Languages, Literature and Culture	12%
Arts, Media and Publishing	11%
Social Sciences	9%
History, Philosophy and Theology	8%
Business, Administration and Law	7%
Preparation for Life and Work	7%
Leisure, Travel and Tourism	3%
Information and Communication Technology	3%
Health, Public Services and Care	2%
Engineering and Manufacturing Technologies	1%
Total	**100%**

Source: Data supplied by Maple Group member colleges.

TABLE 12. Total Maple Group impact in England of added workforce skills (£ thousands)

	TOTAL
Total income in the region	**£1,036,318,592**
Direct effect of added workforce skills	£729,225
Indirect effect	£1,203,086
Total	**£1,932,311**

Source: EMSI.

TABLE 13. Impact of added workforce skills by region (£ thousands)

	TOTAL
Net impact per region	
East of England Region	£156,424
North West Region	£549,118
South East and London Region	£549,173
West Midlands Region	£88,837
Yorkshire and the Humber Region	£74,828
Maple Group total	£1,932,311

Source: EMSI.

. . . .

their workers to hold, the member colleges help produce the skilled workers that are needed to support England labour market. Table 9 presents the percentage breakdown of the Maple Group member college instructional activity by top-level subject sector categories, based on their GLH production. Science and Mathematics comprises the highest percentage of activity (37%), followed by Languages, Literature and Culture (12%) and Arts, Media and Publishing (11%).

Many of the Maple Group member colleges' learners stay in England to study and eventually enter the labour market, and are more productive because of the quality education they received at the member colleges. Over time, the skills of former learners accumulate, steadily increasing the training level and experience of England's workforce. As the skills embodied by former learners

stockpile, a chain reaction occurs in which higher learner incomes generate additional rounds of consumer spending, while new skills and training translate to increased business output and higher property income, causing still more consumer purchases and regional knock-on effects. The sum of all these direct and indirect effects comprises the total impact of the learners' added skills in England's economy.

Assigning a monetary value to the added skills acquired by learners that are active in each regions' workforce requires data on the historical enrolments and corresponding achievement levels of the Maple Group member colleges' learners over the past 15-year-period. Guided Learner Hours (GLH) are used to determine the achievement levels of the Maple Group member colleges' learners, and serve as a proxy for the level of skills learners contribute to each regions' workforce. Using these data in conjunction with the wage differentials from Table 2, we can determine the total amount of higher earnings associated with the educational achievements of past and present learners. We then convert this to value added using the ratios supplied by the IO model. The result, equal to £729.2 million, appears in Table 12 and represents the accumulated direct effect of the added skills acquired by learners whom the Maple Group member colleges have served over the last 15 years.

To calculate the indirect effect, the model allocates increases in regional income to specific industrial sectors and augments these to account for both demand-side and supply-side knock-on effects. Demand-side effects refer to the increased demand for consumer goods and services as the higher incomes of skilled workers and their employers are spent in the regional economies. Supply-side effects occur through a process of 'agglomeration,' whereby growth becomes to some degree self-perpetuating. The presence of one industry, for example, attracts other industries that use the first industry's outputs as inputs, which produces subsequent rounds of industry growth, and so on. Both demand-side and supply-side effects are calculated using the knock-on matrix and value-added to sales ratios provided by the regional IO model.

Altogether, the accumulated contribution of former Maple Group member college learners who are currently employed in the English workforce amounts to £1.9 billion, the sum of £729.2 million in direct effects and £1.2 billion in indirect effects. These results appear in Table 12. Total impact from added workforce skills across each region appears in Table 13. Similar to the other impact results, the sum of the individual regions does not sum to the total across the Maple Group given

different knock-on effects and percentages of learners remaining in the regions.

Total Impact on the Regional and England Economies
Table 14 displays the grand total of the impact of Maple Group member colleges on England and across each region in 2012-13. Altogether, the results of this study show that their economic contribution to the business community in England is approximately £2.1 billion each year. This is equal to around 0.2% of England's total economy and represents roughly 72,704 average wage jobs.

These results demonstrate several important points. First, Maple Group member colleges promote regional economic growth through their operations spending, through the spending of their non-resident learners, and through the increase in productivity as former learners become and remain active in the regional workforces. Second, the impact of added skills in the regional

TABLE 14. Total impact of Maple Group member colleges by region (£ thousands)

	TOTAL
Net total impact per region	
East of England Region	£169,412
North West Region	£593,920
South East and London Region	£596,859
West Midlands Region	£98,509
Yorkshire and the Humber Region	£87,259
Net total impact of Maple Group Colleges	**£2,059,627**

Source: EMSI.

workforces is by far the largest and most important impact of Maple Group member colleges, stemming from higher incomes of learners and their employers. And third, income in England would be substantially lower without the educational activities of the Maple Group member colleges.

CONCLUSION

The results of this study demonstrate that Maple Group member colleges create value from multiple perspectives. They address the needs of employers by providing them with staff development opportunities and supplying the workforce with qualified, trained workers. Regional businesses benefit from the patronage of the Maple Group member colleges and the expenditure of their staff and learners. The Group also indirectly benefits taxpayers by generating increased tax receipts and reducing the demand for public sector services.

The most important value that the Maple Group creates, however, is the impact its member colleges have on their learners. The experiences that learners receive at the member colleges have the power to shape the rest of their lives and put them on the path to becoming happy and productive members of their communities. This, after all, is the Maple Group's mission, and for as long as its member colleges continue to deliver excellence to learners, all other stakeholder groups will see the positive impacts of learning in their lives too.

ECONOMIC IMPACT ANALYSIS - ENGLAND

BENEFITS TO ENGLAND BUSINESS COMMUNITY

£127,136	Added income created by staff and member college expenditure (£ thousands)
£179	Added income created by expenditure of non-resident learners (£ thousands)
£1,932,311	Added income created by added skills (£ thousands)
£2,059,627	Total income created in the England economy (£ thousands)
0.2%	% of total output of the English economy
72,704	Total output as number of average wage jobs

INVESTMENT ANALYSIS

BENEFITS TO LEARNERS

£1,311,792	Net present value of higher future earnings over working life (£ thousands)
16.7%	Return on investment
6.2	Benefit/cost ratio

BENEFITS TO SOCIETY

£4,375,535	Net present value of added income and social externalities (£ thousands)
23.3%	Return on investment
9.0	Benefit/cost ratio

BENEFITS TO TAXPAYERS

£740,669	Net present value of added tax receipts and avoided costs (£ thousands)
22.7%	Return on investment
8.3	Benefit/cost ratio

ABOUT EMSI Economic Modelling Specialists International (EMSI) provides employment data and economic analysis via web tools and custom reports. The company has also produced more than 1,300 comprehensive impact analyses for colleges and universities in the UK, US, Canada, and Australia. Founded in 2000, EMSI is located in Moscow, Idaho with branch offices in the UK, and it serves education, economic, and workforce development institutions and organisations. Visit our website at www.economicmodelling.co.uk for more information.

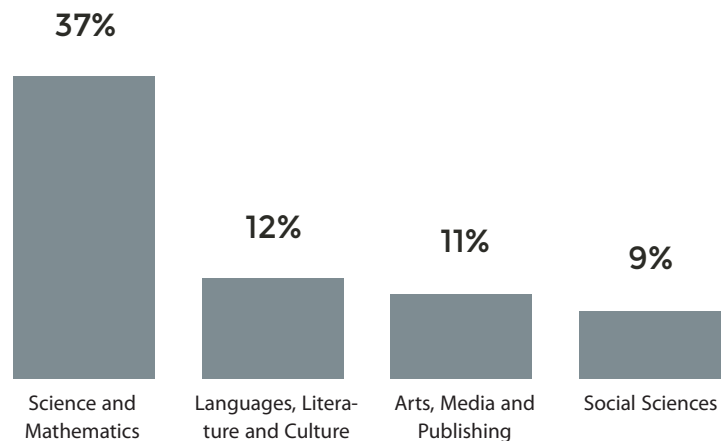**OVERVIEW** ....

The Maple Group of Leading Sixth Form Colleges (Maple Group) benefits the business community surrounding each college in a variety of ways. Not only do the member colleges spend money within England and employ staff, they also train learners to be valuable employees in England's workforce. These roles all add value to businesses by increasing their level of outputs and generating a need for further jobs, creating additional income within England.

MAPLE GROUP MEMBER COLLEGES SUPPORT EMPLOYERS

- Many learners attending the Maple Group member colleges stay in England to study and eventually enter the labour force. The skills the learners gain through the colleges' provision support a wide range of **employment sectors** in England.

- The close relationships that Maple Group member colleges maintain with **higher education institutions** and with **local employers** for preparing learners for additional levels of training and development provide employers with a workforce specifically developed for their business needs and growth strategies.

- The availability of a **skilled workforce** and the training opportunities provided to local employers boosts business outputs through reduced hiring and training costs and, most importantly, higher worker productivity.

Top Programme Areas by Subject Sector

37%	12%	11%	9%
Science and Mathematics	Languages, Literature and Culture	Arts, Media and Publishing	Social Sciences

MAPLE GROUP MEMBER COLLEGES BOOST CONSUMER SPENDING

- Maple Group member colleges are buyers of goods and services and spent over £32.8 million in 2012-13. This expenditure supports the colleges' suppliers, many of which are located within England.

- The member colleges employed 2,465 full-time equivalent staff in 2012-13. Total staff costs amounted to £75 million, much of which was spent in England to purchase groceries, clothing, and other household goods and services.

- The living expenses of Maple Group member colleges' learners who relocate to England also benefit local shops and businesses.

MAPLE GROUP MEMBER COLLEGES STIMULATE INCOME GROWTH

- The skills and qualifications acquired by former learners of Maple Group member colleges bolster England's economy by increasing employer outputs and adding around £1.9 billion in income to the economy per year.

- The expenditures of the member colleges and their staff contribute to knock-on effects throughout the economy, generating approximately £127.1 million in new income to the English total output per year.

- Maple Group member colleges' non-resident learners add £179.4 thousand in new income to England's economy per year through their expenditures for goods and services.

- Altogether, Maple Group member colleges contribute approximately £2.1 billion in additional income per year to the regional business community. This is equal to around 0.2% of England's total economy and represents roughly 72,704 average wage jobs.

- Results are broken out by region of college location below, although the sum of the individuals will not total the overall contribution to the English economy given unique knock-on effects.

TOTAL INCOME CREATED IN ENGLAND BY MAPLE GROUP MEMBER COLLEGES (THOUSANDS)

Impact of College and staff expenditure

£127,136

Impact of non-resident learner expenditure

£179

Impact of learner skills

£1,932,311

Total income created per year

£2,059,627

NET IMPACT PER REGION (THOUSANDS)

	College and staff expenditure	Non-resident learner expenditure	Learner skills	Total
East of England Region	£12,988	£0	£156,424	£169,412
North West Region	£44,763	£38	£549,118	£593,920
South East and London Region	£47,575	£111	£549,173	£596,859
West Midlands Region	£9,672	£0	£88,837	£98,509
Yorkshire and the Humber Region	£12,432	£0	£74,828	£87,259

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Maple Group of Leading Sixth Form Colleges

OVERVIEW

The Maple Group of Leading Sixth Form Colleges (Maple Group) has a significant positive impact on its main stakeholder groups: learners, society, taxpayers, and the regional business community. Using a two-pronged approach that involves an investment analysis and an economic impact analysis for England, the model applied in this study calculates the benefits to each of these groups. This fact sheet presents the key findings.

INVESTMENT ANALYSIS

BENEFITS TO LEARNERS

- Learners as a whole paid a total of **£14.6 million** to cover direct costs such as those for books and supplies, trips, and tuition fees (for adult learners) at Maple Group member colleges in 2012-13. All learners also forwent **£238.1 million** in earnings that they would have generated had they been working instead of learning.

- In return for the monies that learners invest in Maple Group member colleges (i.e., in the form of direct costs and forgone earnings), they will receive a present value of **£1.6 billion** in increased earnings over their working lives.

- Every £1 that learners pay for their education at Maple Group member colleges yields **£6.20** in higher future wages. This translates to a **16.7%** annual return on their investment.

BENEFITS TO SOCIETY

- Society as a whole invested **£547.1 million** in Maple Group member colleges through direct outlays and the loss of potential output from learners who spent time at one of the member colleges rather than working.

- In return, society in the UK will receive a present value of **£4.9 billion** over the course of the learners' working lives, in the form of an expanded tax base and a variety of social benefits related to reduced crime, lower unemployment, and increased health and well-being.

- Society will receive **£9.00** in return for every £1 invested in Maple Group member colleges. The average annual return on investment is **23.3%**.

BENEFITS TO TAXPAYERS

- Taxpayers in the UK paid **£100.9 million** to support the operations of Maple Group member colleges in 2012-13.

- The present value of the added tax revenue stemming from the learners' higher lifetime incomes and the increased output of businesses amounts to **£712.2 million** in benefits to taxpayers. Avoided costs to the public sector adds another **£129.3 million** in benefits due to a reduced demand for government-funded social services in the UK.

- Taxpayers see an average annual return of **22.7%** on their investment in Maple Group member colleges. The corresponding benefit-cost ratio is **£8.30** in benefits returned for every £1 in costs.

FOR EVERY £1 SPENT

£6.20	Gained in lifetime higher earnings for learners
£9.00	Gained in added income and savings to society
£8.30	Gained in added tax receipts and avoided costs to taxpayers

IMPACT ANALYSIS - ENGLAND

IMPACT OF STAFF & MEMBER COLLEGE EXPENDITURE

- Maple Group member colleges as a whole employed **2,465** full-time equivalent (FTE) staff in 2012-13. Staff costs amounted to **£75 million**, much of which was spent in England to purchase groceries, clothing, and other household goods and services.

- The Maple Group member colleges are buyers of goods and services and spent **£32.8 million** to support their operations in 2012-13. Member college expenditure further benefited many regional suppliers in England.

- The net impact of staff and member college expenditure in England comes to approximately **£127.1 million** in added income in the English economy each year.

IMPACT OF LEARNER EXPENDITURE

- Learners at Maple Group member colleges who relocate to England from outside of the area spend money at local shops to buy books and supplies, purchase groceries, rent accommodation, pay for transport, attend sporting events, and so on.

- The expenditure of the Maple Group member colleges' non-resident learners annually adds approximately **£179.4 thousand** in income to England's economy.

IMPACT OF ADDED WORKFORCE SKILLS

- Many of the Maple Group member colleges' learners stay in England, either to work or to continue on with their education. Their enhanced skills and abilities **bolster the output** of regional employers, leading to higher income and a more robust economy.

- The accumulated contribution of former Maple Group member college learners who are currently employed in the workforce amounts to **£1.9 billion** in added income in England's economy each year.

TOTAL IMPACT ON THE ENGLISH BUSINESS COMMUNITY

INCOME BY IMPACT CREATED ACROSS ALL MAPLE GROUP MEMBER COLLEGES (THOUSANDS)

Impact of staff and member college expenditure

£127,136

Impact of non-resident learner expenditure

£179

Impact of learner skills

£1,932,311

Total income created per year

£2,059,627

- Altogether, the economic contribution of Maple Group member colleges to the regional business community in England is **£2.1 billion** each year. Results are broken out by region, although the sum of the individuals will not total the overall contribution to the English economy given unique knock-on effects.

- Total added income created by Maple Group member colleges' learners is approximately equal to **0.2%** of the total economic output of England in 2012-13 and represents roughly **72,704** average wage jobs.

NET TOTAL IMPACT PER REGION (THOUSANDS)

East of England Region	£169,412
North West Region	£593,920
South East and London Region	£596,859
West Midlands Region	£98,509
Yorkshire and the Humber Region	£87,259
Net total impact of Maple Group Colleges in England	£2,059,627

Maple Group of Leading Sixth Form Colleges

LEARNERS   ANALYSIS OF THE SOCIAL & ECONOMIC IMPACT OF LEARNING

OVERVIEW

The Maple Group of Leading Sixth Form Colleges's mission is to deliver excellence to learners. The experiences that learners receive at the member colleges have the power to shape the rest of their lives and put them on the path to becoming happy and productive members of their communities. The member colleges also play a key role in helping them increase their employability and achieve their individual potential.

LEARNING MAKES A DIFFERENCE TO PEOPLE'S LIVES

- Maple Group member colleges provide **excellent environments** for learners to meet new people and develop lasting friendships with others who are in the same stage of life.

- Participating in college courses helps learners improve their self-confidence and develop the tools they need to approach life's challenges. While at the member colleges, learners can establish good habits that will make their lives easier and improve the **overall health and well-being** for themselves and their families.

- The skills and qualifications that learners achieve at Maple Group member colleges will put them on the path to a **fulfilling and prosperous career**.

LEARNING RETURNS GOOD VALUE FOR MONEY SPENT

- To meet the costs of going to the member colleges and depending on their level of funding, learners rely on their own earnings or on their families. At Maple Group member colleges, learners as a whole paid a total of **£14.6 million** in 2012-13 to cover direct costs such as those for books and supplies, trips, and tuition fees (for the colleges who serve adult learners).

- While at the member colleges, learners spend time focusing on their studies, time they would have otherwise spent in employment or with their families and friends. The value of the time and earnings forgone by all learners in 2012-13 is estimated to be **£238.1 million**.

- In return for the costs of going to one of the member colleges, learners receive a stream of higher lifetime earnings. Within a few years, the earnings gains learners receive will fully recover the money they spent and will continue to grow throughout their working lives.

Average Annual Earnings and Unemployment Rate in England

■ Unemployment Rate   ■ Average Earnings

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- Average annual earnings increase as learners attain higher levels of education. Level 3 achievers will earn, on average, **£25,228** at the midpoint of their careers.

- A Level 3 learner will, on average, earn a present value of **£1,135,262** (undiscounted) over their working lifetime, an increase of **£375,044** compared to someone with less than entry level qualifications.

- On average, learners at Maple Group member colleges will receive a cumulative **£6.20** in higher future earnings for every £1 invested in the member colleges (i.e., in the form of tuition fees and forgone time and earnings).

Average lifetime earnings in England by education level, undiscounted

EDUCATION LEVEL	EARNINGS	DIFFERENCE*
< Entry level	£760,218	n/a
Entry	£829,398	£69,180
Level 1	£877,093	£116,874
Level 2	£986,535	£226,317
Level 3	£1,135,262	£375,044
> Level 3	£1,693,670	£933,452

*Represents difference between respective level of education and <Entry level.

EDUCATION IS ONE OF THE BEST INVESTMENTS LEARNERS AND THEIR FAMILIES CAN MAKE

- Learners and their families **invest in education** so that they can acquire the skills and qualifications they need to succeed in the workplace and maintain a higher quality of life.

- Had learners and their families taken the money they spent on education and invested it instead in today's Individual Savings Accounts (ISAs), they would have received a rate of return of **less than 3%**.

- In comparison, Maple Group member colleges' learners receive an average annual rate of return of **16.7%** on their investment in the colleges. This rate of return continues throughout the learners' working lives.

Comparison of Learner Rates of Return
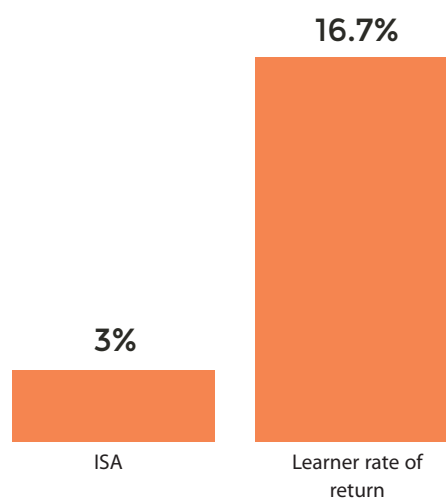
ABOUT EMSI Economic Modelling Specialists International (EMSI) provides employment data and economic analysis via web tools and custom reports. The company has also produced more than 1,300 comprehensive impact analyses for colleges and universities in the UK, US, Canada, and Australia. Founded in 2000, EMSI is located in Moscow, Idaho with branch offices in the UK, and it serves education, economic, and workforce development institutions and organisations. Visit our website at www.economicmodelling.co.uk for more information.

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TAXPAYERS   ANALYSIS OF THE SOCIAL & ECONOMIC IMPACT OF LEARNING

OVERVIEW

Benefits created by the Maple Group of Leading Sixth Form Colleges (Maple Group) extend to far more people than just learners. As learners and employers enjoy higher earnings and increased output, society as a whole benefits from an expanded economy and a range of savings associated with a reduced demand for public services. All of these benefits trickle down to the taxpayers in the form of higher tax receipts and avoided costs, leading to a more prosperous economy and a reduced burden on taxpayers.

## MAPLE GROUP MEMBER COLLEGES RAISE NATIONAL PROSPERITY

- Learners earn more because of the **skills** and **qualifications** they acquire at Maple Group member colleges. Further, employers earn more because the added skills of learners make their businesses more **productive**.

- Together, increases in earnings and business output stimulate corresponding increases in value added and employment throughout the national economy. The present value of the added income created in the UK as a result of the added skills of the learners at Maple Group member colleges comes to **£4.6 billion**.

- As learners earn more, they pay higher income taxes and National Insurance contributions. They also tend to spend more, leading to higher VAT receipts. Employers make higher corporation tax and VAT payments as well through their increased output and higher spending power.

- Altogether, the higher tax receipts collected by the Exchequer from the added taxable income generated in the UK comes to a present value of **£712.2 million**.

£4.6 BILLION
Present Value
Added Income

→

£712.2 MILLION
Present value
Tax Receipts

MAPLE GROUP MEMBER COLLEGES IMPROVE QUALITY OF LIFE

- As learners at Maple Group member colleges achieve higher levels of education, they are statistically more likely to develop good health habits. This leads to a present value of **£56.6 million** in savings to learners and to society as a whole for medical treatment related to tobacco abuse, obesity, and mental disorders.

- Learners enjoy better employment opportunities as a result of their education at the Maple Group member colleges. This makes them less likely to commit criminal offences and less likely to require income assistance. Both effects translate to

Present value of savings to society (£ thousands)

Unemployment
£21,764

Health
£56,625

Crime
£198,808
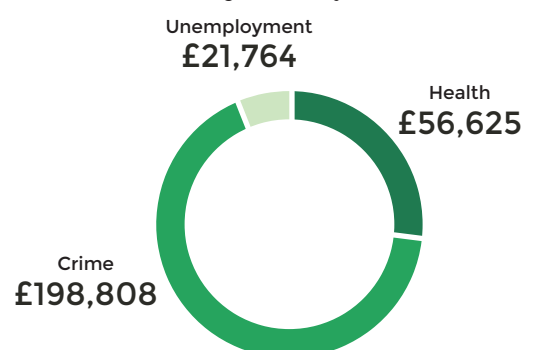
- a present value of **£198.8 million** in law enforcement savings and **£21.8 million** in unemployment-related savings to learners and to society as a whole.

- Altogether, savings to learners and to society as a whole amounts to a present value of **£277.2 million**, equal to the sum of avoided costs related to health, crime, and income assistance.

- As the **improved lifestyles** of learners generate savings to themselves and to society as a whole, taxpayers benefit from a **reduced demand for government-supported services**. Improved health leads to a reduced demand on the National Health Services. Reduced criminal activity places less of a burden on the Criminal Justice System. Finally, increased employability leads to fewer claims for Jobseekers' Allowance benefits.

- Of the total savings to learners and to society as a whole, taxpayers see avoided public sector costs with a present value of **£129.3 million**.

£277.2 MILLION
Present Value
Social Savings

→

£129.3 MILLION
Present value
Taxpayer Savings

MAPLE GROUP MEMBER COLLEGES ARE A SOLID PUBLIC INVESTMENT

- Taxpayers in the UK paid **£100.9 million** from such organisations as the Education Funding Agency to support the operations of Maple Group member colleges in 2012-13.

- For every £1 of public money spent on Maple Group member colleges, taxpayers receive a cumulative return of **£8.30** over the course of learners' working lives in the form of higher tax receipts and avoided public sector costs.

- Taxpayers see an annual return of **22.7%** on their investment in Maple Group member colleges. This return compares favourably with the 3.5% long-term discount rate defined by the HM Treasury Green Book for appraising 30-year investments.

Comparison of Taxpayer Rates of Return

22.7%

3.5%

Discount
Rate

Taxpayer Rate of
Return

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DEMONSTRATING THE VALUE

OF THE

Maple Group of Leading Sixth Form Colleges

Analysis of the Social and Economic Impact of Learning

MAIN REPORT

June 2014

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Preface

Since 2000, Economic Modelling Specialists International (EMSI) has helped address a widespread need in the US and Canada to demonstrate the impact of education. We have conducted more than 1,100 economic impact studies for education institutions in the US and nearly 100 individual and province-wide studies for colleges in Canada.

In 2007, EMSI recognised a similar need in the UK for evidence of the true impact of further education and the expected returns on further investment. Working closely with Warwickshire College, we developed an impact model to quantify such measures, and by the end of 2010 more than 70 colleges had participated in the research.

EMSI set up permanent offices in the UK by early 2012, and we embarked on a second pilot effort to update our model and narrative. The reports underwent a reworking of the organisation and layout, and revisions to the model included the construction of a more robust data collection mechanism and updates to the data and assumptions to reflect the latest economic theory. Throughout this process, we received excellent support from our two pilot colleges, Middlesbrough College and South Staffordshire College, who ensured that the revisions we made reflected the key challenges and issues facing the further education sector. Rachel Jones, Vice Principal at Burton and South Derbyshire College, also provided us with valuable guidance and assistance.

As we release the results of this study, our hope is that they will initiate feedback from all perspectives – whether colleges, policy-makers, inspectors, employers, or learners. We encourage our readers to contact us directly with any questions or comments they may have about the study's findings so that we can continue to keep the public dialogue open about the positive impact of learning.

Acknowledgements

Table of Contents

Introduction

The Maple Group of Leading Sixth Form Colleges (Maple Group) creates value in many ways. The Group is committed to putting learners on the path to success and plays a key role in helping them increase their employability and achieve their individual potential. With a vast range of courses and apprenticeships, the Group's member college provision enables learners to acquire qualifications and develop the skills they need in order to have a fulfilling and prosperous career. The Group's member colleges also provide an excellent environment for learners to meet new people and make friends, while participation in college courses improves the learners' self-confidence and promotes their mental health. All of these social and employment-related benefits have a positive influence on the health and well-being of individuals.

However, the contribution of the Maple Group consists of more than solely influencing the lives of learners. The Group's member college provision supports a range of employment sectors in England and supplies employers with the skilled workers they need to make their businesses more productive. The expenditures of Maple Group member colleges, along with the spending of their staff and learners, further supports the economy through the output and employment generated at local suppliers. Lastly, and just as importantly, the economic impact of the Maple Group extends as far as the Exchequer in terms of increased tax receipts and decreased public sector costs.

Objective of the Report

In this report we assess the economic impact of the Maple Group on its key stakeholder groups: learners, taxpayers, and the business community. The fact that learning makes a difference to these groups is well known, but comparatively little research has been done to quantify the monetary value of the impacts. Some of the more recent studies include Fujiwara's (2012)[1] analysis of the impact of adult learning and the March 2010/11 study commissioned by the Department for Business, Innovation and Skills (BIS)[2] on the economic impact of the FE sector. Although the approaches used in these and other similar studies vary, they all contribute valuable information to the growing body of evidence that proves the value of investing in education.

The approach in this study is twofold. We begin with a standard investment analysis to determine how the investments in the Maple Group will perform for a given investor over time. The investors in this case are learners, taxpayers, and society, all of whom pay a certain amount in costs to support the activities at Maple Group member colleges. The learners' investment consists of the direct costs they pay to attend one of the Group's colleges plus the opportunity cost of spending time learning as opposed to earning

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[1] Daniel Fujiwara, 'Valuing the Impact of Adult Learning' (National Institute of Adult Continuing Education: Leicester, 2012).

[2] Rachel Beaven et al, 'Measuring the Economic Impact of Further Education' (Department for Business, Innovation and Skills, BIS Research Paper Number 38: London, March 2011).

income through employment. Taxpayers contribute their investment through government funding via organisations such as the Education Funding Agency. Society forgoes government services and increased business output that would have been generated had funds not been allocated to the Group's member colleges and learners been employed. In return for these costs, learners receive a lifetime of higher earnings, taxpayers benefit from higher tax receipts and avoided public sector costs, while society gains from higher output and income and a reduced tax burden. To determine the feasibility of the investment, the model projects benefits into the future, discounts them back to their present value, and compares them to their present value costs. Results of the investment analysis for learners, taxpayers, and society are displayed in the following four ways: 1) net present value of benefits, 2) benefit/cost ratio, 3) rate of return, and 4) payback period.

The second component of the study focuses on the economic impacts created by the Maple Group on the business community in England. Economic impact analysis is distinct from investment analysis in that it focuses on a single time period and does not project impacts into the future, nor does it factor in costs incurred by stakeholders. To derive results, we rely on a specialised input-output (IO) model to calculate the additional income created in England's economy as a result of the increased consumer spending and added skills generated by Maple Group member colleges and their learners. Results of the economic impact analysis are measured in terms of the added income created by the following three effects: 1) impact of staff and member college expenditure, 2) impact of learner expenditure, and 3) impact of the skills acquired by learners still active in England's workforce.

Data and assumptions used in the study are based on several sources, including the 2012-13 Individual Learner Records (ILR) reports from Maple Group member colleges, industry and employment data from Nomis official labour market statistics, demographic and earnings data from the Office for National Statistics (ONS), and EMSI's input-output model. The study applies a conservative methodology and follows standard practice using only the most recognised indicators of investment effectiveness and economic impact. For more information on the data used, we encourage our readers to contact the Maple Group.

Organisation of the Report

This report has four chapters and three annexes. Chapter 1 provides an overview of the Maple Group and the English economy. Chapter 2 provides the investment analysis results from the learners' and taxpayers' perspectives. Chapter 3 considers the impact of the Group on economic growth in England. Finally, Chapter 4 provides sensitivity analyses of some of the key variables.

The annexes include a list of resources and references in Annex 1, a glossary of terms in Annex 2, and a discussion of the EMSI input-output model in Annex 3.

Key Findings

The results of this study show that the Maple Group has a significant positive impact on its main stakeholder groups: learners, taxpayers, and society. Using a two-pronged approach that involves an investment analysis and an economic impact analysis across England, we calculate the benefits to each of these groups. Key findings of the study are as follows:

Investment Analysis

Benefits to Learners

- Learners as a whole paid a total of **£14.6 million** to cover direct costs such as those for books and supplies, trips, and tuition and fees (for colleges serving adult learners). All learners also forwent **£238.1 million** in earnings that they would have generated had they been working instead of learning.

- In return for the monies that learners invest in Maple Group member colleges, they will receive a present value of **£1.6 billion** in increased earnings over their working lives.

- Every £1 that learners pay for their education at Maple Group member colleges yields **£6.20** in higher future wages. This translates to a **16.7%** annual return on their investment.

Benefits to Society

- Society as a whole invested **£547.1 million** in Maple Group member colleges through direct outlays and the loss of potential output from learners who spent time at one of the Group's colleges rather than working.

- In return, society in the UK will receive a present value of **£4.9 billion** over the course of the learners' working lives, in the form of an expanded tax base and a variety of social benefits related to reduced crime, lower unemployment, and increased health and well-being.

- Society will receive **£9.00** in benefits for every £1 invested in Maple Group member colleges. The average annual return on investment is **23.3%**.

Benefits to Taxpayers

- Taxpayers in the UK paid **£100.9 million** to support the operations of Maple Group member colleges in 2012-13.

- The net present value of the added tax revenue stemming from the learners' higher lifetime incomes and the increased output of businesses amounts to **£712.2 million** in benefits to taxpayers. Avoided costs to the public sector add

another **£129.3 million i**n benefits due to a reduced demand for government-funded social services in the UK.

- Taxpayers see an average annual return of **22.7%** on their investment in Maple Group member colleges. The corresponding benefit-cost ratio is **£8.30** in benefits returned for every £1 in costs.

Economic Impact Analysis - England

Impact of Staff and Member College Expenditure

- Maple Group member colleges employed **2,465** full-time equivalent (FTE) staff in 2012-13. Staff costs amounted to **£75 million**, much of which was spent in England to purchase groceries, clothing, and other household goods and services.

- The Group's member colleges are buyers of goods and services and spent **£32.8 million** to support their operations in 2012-13. Member college expenditure further benefited many suppliers in England.

- The net impact of staff and member college expenditure in England comes to approximately **£127.1 million** in added income in the economy each year.

Impact of Learner Expenditure

- Learners at Maple Group member colleges relocate to England and spend money at shops to buy books and supplies, purchase groceries, rent accommodation, pay for transport, attend sporting events and so on.

- The expenditure of the Maple Group member colleges' non-resident learners annually adds approximately **£179.4 thousand** in income to England's economy.

Impact of Added Workforce Skills

- Many of the Maple Group member colleges' learners stay in England. Their enhanced skills and abilities bolster the output of English employers, leading to higher income in England and a more robust economy.

- The accumulated contribution of former Maple Group member college learners who are currently employed in the workforce amounts to **£1.9 billion** in added income in England's economy each year.

Total Impact on the English Business Community

- Altogether, the economic contribution of Maple Group member colleges to the business community in England is **£2.1 billion** each year.

- Total added income created by Maple Group member college learners was approximately equal to **0.2%** of the total economic output of England in 2012-13 and roughly **72,704** average wage jobs.

Chapter 1 : Profile of the Group and the English Economy

The input data in this analysis falls under three categories: Maple Group member college data, English economic conditions, and research (e.g., reports, journal articles and data releases conducted by ONS, NHS, etc.). This chapter discusses these data, providing context for the subsequent analysis and assumptions utilised in evaluating the Maple Group.

Group Member Colleges

The Maple Group is a partnership between ten leading Sixth Form Colleges across England with the common interest of providing quality education and learning to young people. The Maple Group member colleges, along with their regional location, are listed below:

- Cardinal Newman College (North West of England)
- Greenhead College (Yorkshire and the Humber)
- Hills Road Sixth Form College (East of England)
- Holy Cross College (North West of England)
- King Edward VI College (West Midlands of England)
- Peter Symonds College (South East of England and London)
- Sir John Dean's College (North West of England)
- St. Dominic's Sixth Form College (South East of England and London)
- The Sixth Form College Farnborough (South East of England and London)
- Winstanley College (North West of England)

Group Data

Data provided by the Maple Group member colleges includes information on college staff, location, revenue and expenditure, learner demographics, and learner achievements. Staff data appear in Table 1.1 for full-time, part-time, and agency staff. Also shown are aggregated data on place of work and place of residence, which is used to isolate the portion of consumption income that remains in the English economy.

Table 1.1: Staff Data, 2012-13

	Total / %
Full-time staff (FTE)	1,229
Part-time staff (FTE)	1,236
Agency staff	3
Total staff	*2,468*
% of staff that live in England	100%
% of staff that work in England	100%

Source: Data supplied by Maple Group member colleges.

Financial Data

Revenues

Table 1.2 shows the revenues of Maple Group member colleges by funding source, totaling £111 million. Tuition fees from learners represented 2%. Public funding from Local Authority Funding, Education Funding Agency, HEFCE and other UK government funding represented 91%. Income from various private funders, including donors and employer funding, represented the remaining 7%.

Table 1.2: Revenue Data, 2012-13 (£ Thousands)

Funding Source	Amount	%
Tuition fees from learners	£1,788	2%
Local Authority Funding	£8	<1%
Education Funding Agency	£100,535	91%
HEFCE funding	£62	<1%
Other UK government funding	£250	<1%
Income from non-government sources	£8,307	7%
Total	*£110,950*	*100%*

Source: Data supplied by Maple Group member colleges.

Expenditures

Total expenditures of Maple Group member colleges totaled £107.8 million in the 2012-13 fiscal year. Staff costs represented 70%, while non-wage spending amounted to 25% of total expenditures. Depreciation of capital and interest payable on debt composed the final 6%.

Table 1.3: Expenditure Data, 2012-13 (£ Thousands)

Function	Amount	%
Staff costs	£75,032	70%
Teaching, teaching support, and other support (non-pay)	£6,644	6%
Administrative and central services (non-pay)	£5,134	5%
General education expenditure (non-pay)	£4,584	4%
Premises (non-pay)	£7,042	7%
Catering, residence, conferences (non-pay)	£1,191	1%
Other operating expenses (non-pay)	£2,025	2%
Depreciation	£5,635	5%
Interest payable	£531	<1%
Total	*£107,817*	*100%*

Source: Data supplied by Maple Group member colleges.

Learner Demographics

Maple Group member colleges served 21,161 full-time and 7,147 part-time learners, with an average learner representing roughly 87% of an FTE. Of the learners, 41% were male and 59% were female. The 28,308 unique learners were enrolled in and generated instructional activity across the three primary funding streams: Employer Responsive (ER), Learner Responsive (LR), and Adult Safeguarded Learning (ASL). Maple Group member colleges also contracted with other institutions to carry out provisions for 53 learners. Table 1.4 shows the total enrolments and ethnicity breakdown for each funding type.

Table 1.4: Enrolments by Ethnicity, 2012-13

	ER	LR	ASL	TOTAL
White - British (%)	66.7%	76.0%	58.4%	75.1%
White - Irish (%)	0.0%	1.0%	0.2%	0.9%
White - Other (%)	33.3%	3.7%	3.5%	3.7%
Black - Caribbean (%)	0.0%	0.8%	0.0%	0.7%
Black - African (%)	0.0%	1.6%	0.3%	1.6%
Black - Other (%)	0.0%	0.2%	0.0%	0.1%
Chinese (%)	0.0%	0.8%	0.3%	0.8%
Asian - India (%)	0.0%	5.7%	0.4%	5.4%
Asian - Pakistani (%)	0.0%	2.9%	0.0%	2.8%
Asian - Bangladesh (%)	0.0%	0.3%	0.0%	0.3%
Asian - Other (%)	0.0%	3.1%	0.3%	3.0%
Other (%)	0.0%	4.0%	36.7%	5.6%

Source: Data supplied by Maple Group member colleges.

Data on ethnicity and gender becomes important in the calculation of marginal earnings change since earnings by gender and ethnicities differ, sometimes widely, depending on the region under analysis.

In order to capture the impacts of the education provided by Maple Group member colleges, we must look at the historical enrolments of each member college since past learners that are still employed in the workforce benefit the economy through their higher output. Table 1.5 shows Maple Group member colleges' historical enrolments.

Table 1.5: Historical Enrolments

Year	Enrolments
1997	19,384
1998	19,575
1999	19,768
2000	21,642
2001	21,875
2002	25,126
2003	24,802
2004	25,821
2005	25,857
2006	26,057
2007	25,917
2008	26,610
2009	27,333
2010	27,478
2011	28,310*

* Note may not match unique learner headcount above due to duplication across funding streams and the inclusion of subcontracted learners.
Source: Data supplied by Maple Group member colleges.

Because of factors such as death, retirement, migration, depreciation of human capital, and college restructuring, we limit our calculation of historical effects to 15 years.[3]

Learner Achievement

Learner achievement data are used to determine the value of the learning provided by the Group member colleges. To do this we first determine the notional level of the learners and their associated Guided Learner Hours (GLH). Only those who generated GLH throughout the year are included; anyone who withdrew, failed, or generated no GLH are excluded from the table. It is worth noting that the notional level of the learner will not always match the notional level of the GLH they are taking, but all GLH will contribute to the terminating qualification.

Table 1.6 shows Maple Group member colleges' enrolments by qualification. Columns represent the funding stream and rows represent the notional level of the enrolment

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[3] If the College is unable to provide us with historical enrolment data over the past 15-year period, our model projects the historical enrolment for the missing years using data from the available years. Where colleges have been in operations less than 15 years, enrolments will only be calculated back to the establishment year.

categorised by whether the qualification is the enrollee's first full qualification, an additional qualification of the same level, or if the enrollee only partially completed the qualification. The table includes enrolments provided by Maple Group member colleges for other contracting FE and HE institutions. Note that since the table shows total enrolments, duplication between learners does exist as a learner could be taking multiple aims across different levels and funding streams.

Table 1.6: Enrolments by Qualification, 2012-13

ENROLMENTS	ER	LR	ASL	TOTAL
First Full Qualification				
Level 2	0	51	0	**51**
Level 3	2	27,637	0	**27,639**
> Level 3	0	10	0	**10**
Other Full Qualification				
Level 2	0	236	0	**236**
Level 3	0	152	0	**152**
Partial Qualification				
Entry Level	0	2,663	1,938	**4,601**
Level 1	0	788	147	**935**
Level 2	0	238	1	**239**
Level 3	0	9,021	0	**9,021**
> Level 3	0	220	0	**220**
Total	*2*	*41,016*	*2,086*	*43,104*

Source: Data supplied by Maple Group member colleges.

Table 1.7 shows the GLH completed by the associated enrolments from Table 1.6. These are GLH provided by Maple Group member colleges' instructors. Similar to Table 1.6, this table includes GLH provided by Maple Group member colleges for other contracting FE and HE institutions. This detail on the GLH allows us to capture the economic activity that the staff at the member colleges provides.

Table 1.7: GLH Activity by Qualification, 2012-13

GLH	ER	LR	ASL	TOTAL
First Full Qualification				
Level 2	0	14,360	0	**14,360**
Level 3	472	10,762,524	0	**10,762,996**
> Level 3	0	2,442	0	**2,442**
Other Full Qualification				
Level 2	0	77,056	0	**77,056**
Level 3	0	54,906	0	**54,906**
Partial Qualification				
Entry Level	0	125,641	42,268	**167,909**
Level 1	0	27,169	3,914	**31,083**
Level 2	0	30,601	20	**30,621**
Level 3	0	2,587,313	0	**2,587,313**
> Level 3	0	28,724	0	**28,724**
Total	*472*	*13,710,736*	*46,202*	*13,757,410*

Source: Data supplied by Maple Group member colleges.

Economic Conditions across England

The service region[4] of the Maple Group, referred to as England, includes the North West, West Midlands, Yorkshire and the Humber, East, London, South East, and East Midlands Government Office Regions in England. This region serves as the backdrop against which the relative impacts of the Group member colleges and their learners are measured. Since Maple Group member colleges first opened their doors, they have been serving England by creating jobs and income, providing area residents with easy access to further education opportunities, and preparing learners for highly-skilled, technical professions. The availability of quality education and training in England also attracts new industry to the region, thereby generating new businesses and expanding the availability of public investment funds.

Table 1.8 summarises the breakdown of England's economy by major industrial sector, with details on employment and value added for each. Value added refers to the earnings, profits, and taxes that together represent the total value the industrial sector has added. The final column in Table 1.8 shows the percentage of total value added in England for which each sector is responsible.

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[4] The breakdown of the service region is defined by the Nomenclature of Territorial Units for Statistics level 3 (NUTS3) and is comprised of upper tier authorities or groups of lower tier authorities. We recognise that some colleges may have smaller service regions than the NUTS3 level, but the background data for the model is available only at the NUTS3 level.

Table 1.8: Employment and Value Added by Major Industrial Sector in England, 2012-13

	Jobs	Value Added (Millions)	% of Total Value Added
Agriculture, forestry and fishing	133,443	£6,057	<1%
Mining and quarrying	19,145	£7,060	<1%
Manufacturing	1,726,803	£75,445	7%
Electricity, gas, steam and air conditioning supply	64,513	£23,591	2%
Water supply; Sewerage, waste management and remediation activities	131,862	£15,995	2%
Construction	842,796	£65,740	6%
Wholesale and retail trade; Repair of motor vehicles and motorcycles	3,265,740	£98,159	9%
Transportation and storage	983,983	£50,697	5%
Accommodation and food service activities	1,360,447	£32,319	3%
Information and communication	892,948	£75,363	7%
Financial and insurance activities	834,457	£65,018	6%
Real estate activities	342,550	£127,018	12%
Professional, scientific and technical activities	1,598,845	£115,220	11%
Administrative and support service activities	1,792,820	£62,612	6%
Public administration and defence; Compulsory social security education	942,230	£46,791	5%
Education	1,849,244	£66,065	6%
Human health and social work activities	2,440,473	£65,282	6%
Arts, entertainment and recreation	474,930	£21,073	2%
Other service activities	430,594	£16,812	2%
Totals	*20,127,826*	*£1,036,319*	*100%*

Source: EMSI.

In Table 1.9 and Figure 1.1, the average earnings in England at the midpoint of an individual's working career are broken out by education level. In return for the costs of education, learners receive a stream of higher future earnings that continues to grow throughout their working lives. Mean income levels at the midpoint of the average-aged worker's career increase as individuals attain higher levels of education. The marginal differences between education levels form the basis for determining the earnings benefits that accrue to learners in return for their education investment. For example, the average A Level or equivalent achiever in England will see an increase in earnings of £8,334 each year compared to someone with no formal qualifications. This amounts to approximately £375,044 in higher earnings (undiscounted) over a working lifetime.

Table 1.9: Average Earnings and Unemployment Rates by Education Level in England, 2012-13

Education Level	Earnings*	Unemployment
No qualification	£16,894	15%
Entry Level qualification	£18,431	13%
Other qualifications	£19,491	11%
GCSEs grades A*-C or equivalent	£21,923	10%
A Level or equivalent	£25,228	7%
Higher education and greater	£37,637	4%

Source: ONS Labour Force Survey and Nomis Annual Survey of Hours and Earnings
* Earnings are weighted by gender and ethnicity demographics supplied by Maple Group member colleges.
Source: ONS Labour Force Survey and Nomis Annual Survey of Hours and Earnings.

Figure 1.1: Average Income at Career Midpoint
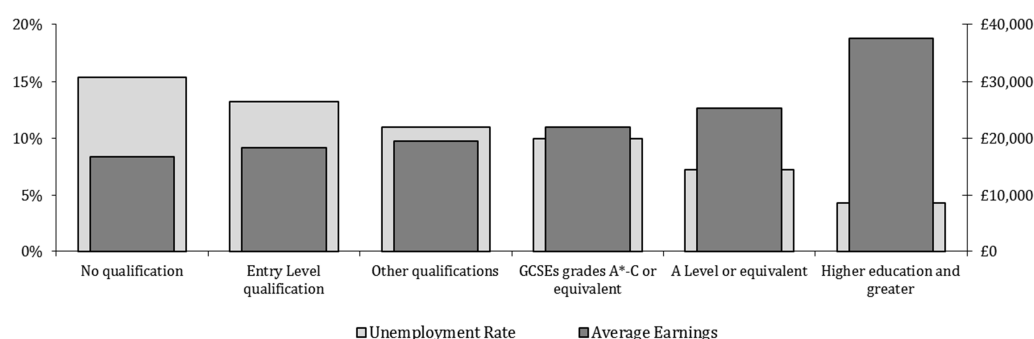
Just as average earnings increase as they attain more education, employment prospects also increase. Table 1.9 shows the unemployment rate by highest qualification attained in England. The highest unemployment rates occur among workers with no qualifications or an entry level qualification.

Research

The data and methodology collected from research largely come from government studies and are usually treated as constants or parameter values in the analysis. For example, *The Green Book* issued by HM Treasury reports the following table in Annex 6.

Table 1.10: The Declining Long-term Discount Rate

Period of years	0-30	31-75	76-125	126-200	201-300	301+
Discount rate	3.5%	3.0%	2.5%	2.0%	1.5%	1.0%

Source: The 2012 Green Book Table 6.1

In accordance with this, we apply a 3.5% discount rate to the cash flows for the first 30 years and a 3% discount rate for the cash flows greater than 30 years.[5] Many of the research sources, along with the constants or parameter values drawn from them, will be referenced throughout this report, but a short list of the most prominent sources are provided here.

Table 1.11: Research Sources

Research Data	Source
Regional employment and earnings	Annual Survey of Hours and Earnings - ONS (NOMIS)
Earnings by education level and ethnicity	Labour Force Survey - ONS
Population	Population Estimates - ONS
Attrition	
Retirement	Gov.UK, Life Tables - NHS
Unemployment	Labour Force Survey - ONS
Social variables	
Smoking	NHS, ASH
Mental Health	Sainsbury Centre for Mental Health (SCMH), NHS
Crime	National Literacy Trust, Home Office Online Report
Unemployment	Labour Force Survey - ONS, Department of Work and Pension
Obesity	NHS, Department of Health
Learner spending	National Union of Students

Conclusion

This chapter summarises key data and facts on the Maple Group and England as the region the member colleges serve. The figures presented in the tables above represent the broader elements of the database used to determine the results. Additional detail on data sources, assumptions, and general methods underlying the analyses are conveyed in the remaining chapters and appendices. The core of the findings is presented in the next two chapters. The annexes detail a collection of miscellaneous theory and data issues.

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[5] The time horizon does not extend beyond 75 years since it is limited to the learner's working life.

Chapter 2 : Investment Analysis

Investment analysis is the process of evaluating total costs and measuring these against total benefits to determine whether or not a proposed venture will be profitable. If benefits outweigh costs, then the investment is viable. If costs outweigh benefits, then the investment will lose money and is thus considered infeasible.

In this chapter we analyse the benefits and costs of investing in Maple Group member colleges from the perspective of the learners, society at large, and lastly the public sector. The backdrop for the analysis is the entire nation.

Learner Perspective

Analysing the benefits and costs of education from the perspective of learners is the most obvious—they give up time and money to go to Maple Group member colleges in return for a lifetime of higher income and improved employment opportunities. The benefit component of the analysis thus focuses on the extent to which learner incomes and employment probabilities increase as a result of education, while costs comprise all learners' direct outlays (books, supplies, and tuition fees for adult learners) as well as their opportunity costs (wages and income forgone while at one of the member colleges).

Education, Earnings and Employment

The correlation between education, earnings, and employment is well documented and forms the basis for determining the learners' benefits stream and future cash flows. Table 1.9 (Chapter 1) shows the mean income and unemployment rate by education level weighted by the gender and ethnicity of the learner population.

The differences between income levels and unemployment rates begin to define the marginal value of moving from one education level to the next. For example, moving from GCSEs grades A*-C or equivalent to an A-level yields an additional £3,305 per year and increases employment probability by 3%.

Of course, several other factors such as ability, socioeconomic status and family background also correlate with higher earnings. Failure to account for these factors results in what is known as an 'ability bias'.[6] To account for the implicit bias in the data, EMSI commissioned a meta-analysis to ascertain the degree of bias and the amount by which the marginal gains should be reduced. Doctors Molitor and Leigh (2005) concluded that a 10% reduction in the earnings gain was necessary to account for such innate characteristics of the learners.[7]

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[6] Ability bias in data was recognised as early as Adam Smith, but was formally acknowledged as a biasing factor in human capital data by J.R. Walsh in 1935.

[7] The BIS adopted the approach of looking at earnings differences between cohorts with similar characteristics but where the educational levels differed. While this approach is useful and does not require

Marginal Earnings Value per GLH

Not all learners who attended one of the Maple Group member colleges in the 2012-13 reporting year obtained a degree or certificate. Some may have returned the following year to complete their education goals, while others may have taken a few units and entered the workforce without achieving a qualification. As the education of such learners still carries value, though not the weight of a full NVQ, we must look deeper than qualification completion to measure the value of intermediary education provision. The most consistent way of capturing the intermediary activity of the member colleges and their learners is through Guided Learner Hours (GLH).

It is important to remember that from an economics perspective learners will eventually be paid according to their marginal value of product. Therefore, we link such output metrics to marginal gains in educational attainment. Attributing value to full qualifications alone assumes no increase in marginal value of product from intermediary education. According to prevailing human capital theory, such an assumption is flawed. It is more appropriate to utilise a quasi-continuous step function where learners increase their marginal value of product, and thus income, for every GLH received. The sheepskin effect, or more generically the signaling effect, resulting from the full qualification is the cause for the step function nature of the earnings curve. A qualification signals to employers the marginal value of product a learner can generate. Thus, a full NVQ has additional value over a unit in terms of increased earnings and the employment premia. These two things combined represent the sheepskin effect.

We calculate the value of the learners' GLH production through a process that divides the education ladder into a series of individual steps, each equal to one GLH. We then spread the income differentials from Table 1.9 over the steps required to complete each education level, assigning a unique monetary value to every step in the ladder.[8] Next we map the learners' GLH production to the ladder, depending on their level of achievement and the average number of GLH they achieve. Finally, we multiply the volume of GLH at each step in the ladder by the marginal earnings gain attributable to the corresponding step to arrive at the learners' average annual increase in income. Under this framework the annual change in earnings, ΔE, is computed simply as:

$$\Delta E = \sum_{i=1}^{n} e_i h_i \text{ where } i \in 1, \ 2, ... n \text{ and } n \text{ is the number of steps in the education ladder.}$$

Variables e_i and h_i represent the marginal earnings gain and number of GLH completed by the learner body for each step *i*. Total earnings change divided by the total GLH completed by the learners gives the average value per GLH for the 2012-13 learner body.

Table 2.1 displays the aggregate annual higher income for the Maple Group member colleges' learner population. Also shown are the total GLH generated by learners and the

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explicit discounting, it cannot be used at a regional level since the earnings differ regionally from national averages.

[8] Learners who obtain their first full qualification during the reporting year are granted the income boost derived from the signaling effect of the credential.

average value per GLH. Note that although each step in the education ladder has a unique value, for the sake of simplicity only the total and average values are displayed.

Table 2.1: Higher Annual Earnings, GLH Production, and Value per GLH, 2012-13

Total Increase In Earnings	£94,328,416
Total Completed GLH	13,757,410
Average Value per GLH	£6.86

Source: EMSI.

Here a qualification must be made. Data show that earnings levels do not remain constant; rather, they start relatively low and gradually increase as the worker gains more experience. Research also indicates that the earnings increment between educated and non-educated workers grows through time. This means that the aggregate annual higher income presented in Table 2.1 will actually be lower at the start of the learners' careers and higher near the end of them, gradually increasing at differing rates as the learners grow older and advance further in their careers.

Generating the Stream of Cash Flows

The two names most often associated with human capital theory and its applications are Gary Becker and Jacob Mincer.[9] The standard human capital earnings function developed by Mincer appears as a three-dimensional surface with the key elements being earnings, years of education and experience. Figure 2.1 shows the relationship between earnings and age, with age serving as a proxy for experience. Note that, since we are using the graph strictly for illustrative purposes, the numbers on the axes are not specific to England.

Figure 2.1 illustrates several important features of the Mincer function. First, earnings initially increase at an increasing rate, later increase at a decreasing rate, reach a maximum somewhere after the midpoint of the working career, and then decline in later years as individuals ease into retirement. Second, at higher levels of education, the maximum level of earnings is reached at an older age. And third, the benefits of education, as measured by the difference in earnings for two levels, increase with age.

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[9] See Gary S. Becker, *Human Capital: a Theoretical Analysis with Specific Reference to Education* (New York: Columbia College Press for NBER, 1964); Jacob Mincer, 'Schooling, Experience and Earnings' (New York: National Bureau of Economic Research, 1974); and Mincer, 'Investment in Human Capital and Personal Income Distribution,' *Journal of Political Economy,* vol. 66 issue 4, August 1958: 281–302.

Figure 2.1: Lifetime Earnings Profile for Entry Level and Level 1 Qualification Recipients

Real Earnings

- - - Entry Level ——— Level 1
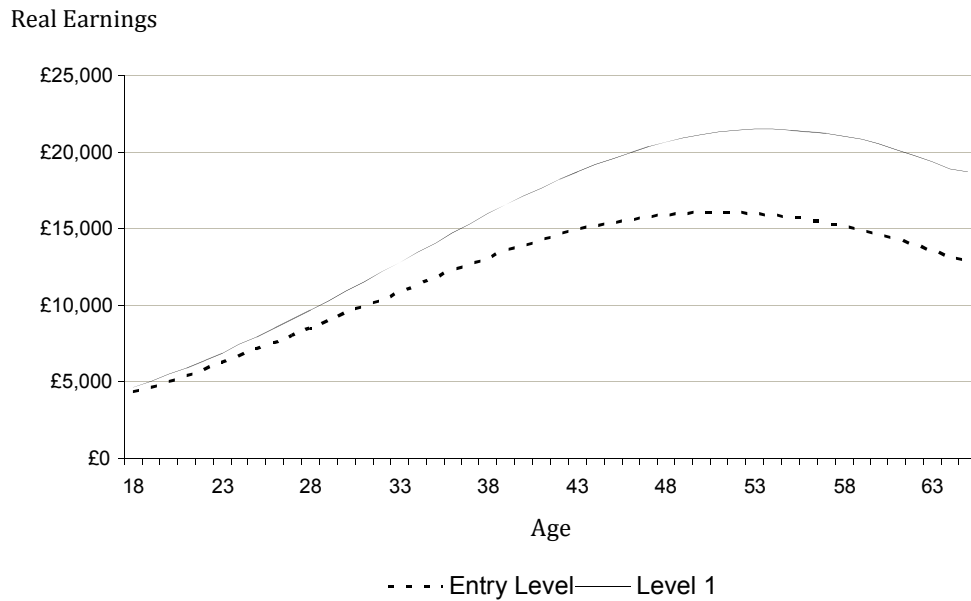
In the model, we employ the Mincer function as a smooth predictor of earnings over time[10] for as long as learners remain active in the workforce. Using earnings at the career midpoint as our base (Table 1.9), we derive a set of scalars from the slope of the Mincer curve to model the learners' increase in earnings at each age within their working careers. The result is a stream of projected future benefits that follows the same basic shape as the Mincer curve, where earnings gradually increase from the time learners enter the workforce, come to a peak shortly after the career midpoint, and then dampen slightly as learners approach retirement at age 65.

The benefits stream generated by the Mincer curve is a key component in deriving the learners' rate of return. However, not all learners enter the workforce at the end of the reporting year, nor do all of them remain in the workforce until age 65. To account for this, we discount the learners' benefit stream in the first few years of the time horizon to allow time for those who are still studying at one of the member colleges to complete their educational goals and find employment. This is referred to as delaying the onset of the benefits. Next, we discount the entire stream of benefits by the estimated number of learners who will die, retire or become unemployed over the course of their working careers.[11] The likelihood that learners will leave the workforce increases as they age—so

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[10] The Mincer equation is computed based on estimated coefficients presented in Robert J. Willis, 'Wage Determinants: A Survey and Reinterpretation of Human Capital Earnings Function' in *Handbook of Labor Economics*, Vol. 1 (Amsterdam: Elsevier Science Publishers, 1986): 525–602. These are adjusted to current year dollars in the usual fashion by applying the GDP implicit price deflator. The function does not factor in temporary economic volatility, such as high growth periods or recessions. In the long run, however, the Mincer function is a reasonable predictor.

[11] These data are based on the ONS life tables and net regional migration data following a log linear trend line.

the older the learner population is, the greater the attrition rate will be. The resulting benefits stream can be found in Table 2.3.

Learner Investment Costs

Having calculated the learners' benefits stream and adjusting it for attrition, we next turn to learner costs. The learners' costs of investment are composed of direct outlays and opportunity costs. Direct outlays represent any out-of-pocket expenses to the learner, such as those for tuition fees (for colleges who serve adult learners), books, and supplies.[12] Some learners incur more out-of-pocket expenses than others, for example adult learners aged 19 and over are more responsible for paying tuition costs whereas those aged 16-18 are fully funded. For the purposes of this analysis, we just look at the total direct outlays incurred by the learner body as a whole, not separated out by funding levels.

Opportunity costs apply to all learners and represent forgone income. We assume that every hour a learner is in the classroom or engaged in an educational activity is an hour they could have been receiving a wage. Since tuition fees simply capture the payments made by learners and their families directly to one of the Maple Group member colleges, measuring costs and benefits through GLH creates a more accurate representation. Learners in apprenticeship programmes, largely captured under the ER data, will obviously receive a different opportunity cost rate per GLH than those captured under the LR or ASL funding categories.

Table 2.2: Learner Investment Costs, 2012-13 (£ Thousands)

	Total
Learner Direct Costs	
Tuition and Fees	£1,788
Books and Supplies	£12,770
Room & Board*	£116
Personal Expenses*	£65
Transportation*	£18
Working Learners	
Opportunity Costs - Apprenticeships	£8
Opportunity Costs - Non-Apprenticeships	£3,543
Non-working Learners	
Opportunity Costs - Non-Apprenticeships	£234,537
Total Learner Costs	*£252,646*

* Room and board, personal expenses and transportation are only captured for non-resident learners on the impact side and are not included in the investment analysis. Total learner costs therefore exclude those expenses.
Source: EMSI model.

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[12] Learners also spend money on room and board, personal expenses etc. These costs and their associated impacts are discussed more fully in chapter 3.

The majority of costs, however, are not captured in the direct outlays of the learners but rather through their opportunity costs. These costs are a function of learner employment rates, the number of GLH taken by the learners, prior education level, and the associated earnings by education level. Recall that Table 1.9 displays earnings at the midpoint of the individual's working career, not immediately upon exiting college. To arrive at the full earning potential of learners while enrolled, we must condition the earnings levels to the learners' age, which we accomplish simply by applying a scalar derived from the Mincer curve described above. Another important factor to consider is the time that learners actually spend at college since they would only be giving up earnings for the period in which the Maple Group member colleges are in session, and then only for the hours they are in class. We use the volume of GLH taken by the learners as a proxy for working hours forgone. Beginning with the conditioned average annual incomes by education level and the learners' education levels at the start of the reporting year, we determine the potential lost income to three distinct categories of learners: apprentices, non-apprentices that are employed while attending one of the Maple Group member colleges, and non-apprentices that are not working. The Maple Group member colleges had 1 apprenticeship enrolments, 617 working non-apprenticeship enrolments, and 27,689 non-working learners.

Since learners in both apprentice programmes and those otherwise engaged in the labour force receive some portion of what their income would be otherwise, their opportunity costs are mitigated. They also forgo leisure, which Becker (1974) attributes value to. As the majority of the learners are not engaged in the labour force and because they forgo the entirety of their would-be income, it is not surprising that they represent the bulk of the learner body's opportunity costs. Opportunity and auxiliary costs total £238.1 million. Learners employed while attending one of the member colleges do a great deal to mitigate their opportunity costs and thus will have higher than average benefit-cost ratios and correspondingly higher rates of return.

Learner Investment Outcomes

Since the benefits to learners do not all occur in the current year like the costs, we must discount the future benefits to their present value. As stated in *The Green Book,*

> *Discounting is a technique used to compare costs and benefits that occur in different time periods. It is a separate concept from inflation, and is based on the principle that, generally, people prefer to receive goods and services now rather than later. This is known as 'time preference'.*

In accordance with *The Green Book,* we apply a 3.5% discount rate for the first 30 years and a 3% discount rate for subsequent years. Standard investments tend to have a much shorter time horizon and use only one discount rate. However, education is a long-term investment and the different discount rates are used to account for any uncertainty resulting from the extended time horizon. Though the discount rate used is provided by

The Green Book, it is not an observed value. Thus, in Chapter 4, a sensitivity analysis is provided to show how the results vary in accordance with the discount rate.

Discount Rate

The discount rate is a rate of interest that converts future costs and benefits to present values. For example, £1,000 in higher earnings realised 30 years in the future is worth much less than £1,000 in the present. All future values must therefore be expressed in present value terms in order to compare them with investments (i.e., costs) made today. The selection of an appropriate discount rate, however, can become an arbitrary and controversial undertaking. As suggested in economic theory, the discount rate should reflect the investor's opportunity cost of capital, i.e., the rate of return one could reasonably expect to obtain from alternative investment schemes.

Column 1 of Table 2.3 shows the number of years beyond the analysis year (i.e., year zero is the analysis year where costs are incurred and net benefits are negative). Columns 2 through 4 show the gross cash flows received each year, the percent of learners active in the workforce (including the employment premia) and the net higher earnings that are projected to be realised. Column 5 shows one year's worth of costs to the learners.[13] Lastly, Column 6 shows the net cash flows.

The average learner age at the Maple Group member colleges while enrolled is 18. Adding one year to this (the analysis year) and subtracting from the retirement age of 65 yields a time horizon of 46 years. The last four rows in the table show the Maple Group learner investment results: net present value (NPV), benefit/cost ratio (B/C), internal rate of return (IRR),[14] and payback period. Equations and definitions of these terms may be found in the glossary provided in Annex 2.

The 2012-13 Maple Group member college learner body is expected to see the present value of their lifetime incomes rise by £1.6 billion, while the costs of obtaining these gains is only £252.6 million. This means learners receive a net gain of £1.3 billion and, on average, their benefits are 6.2 times larger than their investment. Put another way, for every £1 learners invest in direct outlays and opportunity costs, they receive £6.20 in return. This translates into a 16.7% average annual rate of return, with all of the learners' costs recovered in 9 years. In other words, the learners will generate pure costless rents for 37 years of their working life.

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[13] The £606 million in costs is already in present value since it occurs in the current year and does not need to be discounted.

[14] The IRR is used for investments where the principle invested is not recaptured at the sale or maturity date of the investment, such as is the case with stocks or bonds.

Table 2.3: Learner Perspective (£ Millions), 2012-13

Year	Gross Higher Earnings	% Active in Workforce	Net Higher Earnings	Cost	Net Cash Flow
0	31.4	13%	4.1	252.6	-248.5
1	34.1	34%	11.7	0.0	11.7
2	37.0	52%	19.3	0.0	19.3
3	40.0	66%	26.3	0.0	26.3
4	43.1	75%	32.3	0.0	32.3
5	46.3	82%	38.1	0.0	38.1
6	49.6	87%	42.9	0.0	42.9
7	53.0	89%	47.0	0.0	47.0
8	56.4	90%	50.7	0.0	50.7
9	60.0	90%	54.0	0.0	54.0
10	63.6	90%	57.4	0.0	57.4
11	67.3	90%	60.7	0.0	60.7
12	71.0	90%	64.0	0.0	64.0
13	74.7	90%	67.3	0.0	67.3
14	78.4	90%	70.6	0.0	70.6
15	82.1	90%	73.9	0.0	73.9
16	85.8	90%	77.2	0.0	77.2
17	89.5	90%	80.5	0.0	80.5
18	93.1	90%	83.7	0.0	83.7
19	96.6	90%	86.9	0.0	86.9
20	100.1	90%	89.8	0.0	89.8
21	103.4	90%	92.8	0.0	92.8
22	106.6	90%	95.7	0.0	95.7
23	109.7	90%	98.2	0.0	98.2
24	112.6	90%	100.7	0.0	100.7
25	115.3	90%	102.7	0.0	102.7
26	117.9	90%	105.0	0.0	105.0
27	120.2	89%	107.1	0.0	107.1
28	122.4	89%	108.4	0.0	108.4
29	124.3	89%	109.7	0.0	109.7
30	126.0	89%	110.7	0.0	110.7
31	127.4	89%	112.0	0.0	112.0
32	128.6	87%	113.0	0.0	113.0
33	129.6	87%	112.9	0.0	112.9
34	130.3	87%	112.7	0.0	112.7
35	130.7	87%	112.7	0.0	112.7
36	130.9	87%	112.9	0.0	112.9
37	120.4	85%	104.0	0.0	104.0
38	120.2	85%	102.9	0.0	102.9
39	97.6	85%	83.0	0.0	83.0
40	97.4	85%	82.8	0.0	82.8
41	96.9	85%	82.4	0.0	82.4
42	96.3	83%	81.7	0.0	81.7
43	95.4	83%	80.3	0.0	80.3
44	94.4	83%	78.7	0.0	78.7
NPV			*£1,564.4*	*£252.6*	*£1,311.8*
B/C ratio					*6.2*
IRR					*16.7%*
Payback (yrs)					*8.6*

Social Perspective

Looking at investment from the social perspective is structurally no different than the learner perspective, although the breadth of the costs and benefits captured is much

larger. From society's perspective, we are looking at all costs and benefits due to the operations of the Maple Group member colleges, regardless to whom the costs and benefits accrue.

Capturing the social perspective provides proof that Maple Group member colleges act as social enterprises. The higher levels of education their learners gain enable the community to overcome social problems, such as by lowering crime rates and improving health. In particular, the Maple Group member colleges improve their learners' life chances by giving them the tools they need to succeed in their careers. The higher incomes the learners receive as a result expand the economic base, thereby creating wealth and providing a way for people to be invested in their economy. These demonstrate that, while Maple Group member colleges operate as a business, they ultimately serve a social mission.

Social Costs

Social costs also break down into direct outlays and opportunity costs. Direct outlays to Maple Group member colleges in the analysis year are the sum of operating and non-operating revenues (£111 million). Learners, as previously discussed, give up earnings that they could have otherwise earned. Private businesses have a smaller pool of labour to draw from since individuals are engaged in education rather than business sector output, thus GDP is, in the short run, not as large as it may otherwise have been. Similarly, society experiences a loss in government services that would have been undertaken had taxes been collected on the earnings that learners forgo. All of these represent opportunity costs to society as a whole.

Notice the implicit and conservative assumption being made in regards to the opportunity costs. We assume all labour and resources would have been employed (i.e., the assumption of no idle resources). This is a conservative assumption since it increases the costs being captured. We know that in the absence of high-skilled labour, low-skilled, and possibly unemployed labour can be substituted. Alternatively, high-skilled labour could be imported from other countries, increasing output back to 'expected' levels.

These opportunity costs to society all stem from lower labour and output. To capture social opportunity costs then, we take the learner opportunity costs and run them through a knock-on matrix to see what additional labour and non-labour impacts are being forgone. These additional losses stemming from the learners' decision not to be employed in the workforce are added to learner opportunity costs and to total revenues of Maple Group member colleges to derive the total costs to society of £547.1 million.

Table 2.4: Present Value Social Costs (£ Thousands), 2012-13

	Total
Direct outlays	£110,950
Opportunity costs of learners	£238,088
All other opportunity costs	£198,101
Total	*£547,139*

Source: EMSI model.

Social Benefits

Any benefits that accrue within the UK as a result of Maple Group member colleges—whether they accrue to learners, employers, taxpayers, or private residents—are claimed under the social perspective. These benefits are subdivided into two components: (1) increased income, and (2) social externalities stemming from the improved lifestyles of learners.

Increased Income

Income growth occurs as the output of learners increases as a result of their education. Capital, such as machinery and buildings, is made more productive through the increased skills derived from education. This in turn raises profits and other business property income. Together, increases in labour and capital income are considered the effect of a skilled workforce. Estimating the effect of Maple Group member colleges on income growth begins with the projected higher learner income from Table 2.3 above. Not all of these benefits may be counted as benefits to the public, however. Some learners may emigrate during the course of their careers, and any benefits they generate leave with them. To account for this dynamic, we use estimates on migration patterns to calculate the number of learners who leave the workforce over time. Note that death, retirement, and unemployment have already been captured in the learners' NPV calculation.

Next we derive a stream of cash flows that accrue to the public. These comprise the direct effect of Maple Group member colleges on income growth. Indirect effects occur when learners spend more money on consumer goods, while the increased output of businesses that employ them also creates a demand for inputs and, consequently, input spending. The effect of these two spending items (consumer and business spending) leads to still more spending and more income creation, and so on. To quantify the impact of these several rounds of spending, we apply a multiplier derived from EMSI's specialised input-output (IO) model, described more fully in Annex 3.

With an increase in labour income (both direct and indirect) comes an increase in capital investment, thereby generating even more growth in the non-labour (or 'non-earnings') share of the economy. Non-labour income consists of monies gained through investments (dividends, interests and rent). To derive the growth in non-labour income, we multiply the direct and indirect labour income figures by a ratio of GDP (equal to labour income plus non-labour income) to total labour income.

Next, rather than adjusting for attrition, which is already captured in the learners' net higher earnings, we adjust for the alternative education variable. This variable looks at the degree to which learners would be able to obtain education and the increased role industry would play in providing workforce training if public funding for education did not exist. That is, Maple Group member colleges' learners would substitute towards other educational opportunities (e.g., private education, on-the-job training, etc.) if the member colleges did not exist. The Maple Group cannot claim benefits that would still have been generated in its member colleges' absence. The top row of Table 2.5 below displays the present value of the added income that occurs in the UK over the lifetime of Maple Group member colleges' learners.

Social Externalities

In addition to higher income, education is statistically correlated with a variety of lifestyle changes that generate social savings, also known as external or incidental benefits of education. These social savings represent avoided costs that would have otherwise been drawn from private and public resources absent the education provided by Maple Group member colleges.

It is important to note that calculating social externalities is not a straightforward task of counting actual monies saved. The process is difficult because of the uncertainties about what data to include, what methodologies to employ and what assumptions to make. Because of this, results should not be viewed as exact, but rather as indicative of the impacts of education on health and well-being. Social externalities stemming from education break down into three main categories: 1) health savings, 2) crime savings, and 3) national insurance savings.

Table 2.5: Present Value Social Benefits (£ Thousands), 2012-13

	Total
Increased Income	£4,645,478
Social Externalities	£277,197
Health	£56,625
Smoking	£19,790
Obesity	£6,702
Mental health	£30,133
Crime	£198,808
National Insurance	£21,764
Total	*£4,922,674*

Source: EMSI model.

In the model, we quantify the effect of social externalities first by calculating the probability at each education level that individuals will have poor health, commit crimes or claim national insurance transfers. Deriving the probabilities involves assembling data at the national level, breaking them out by gender and ethnicity, and adjusting them from national to regional levels. We then spread the probabilities across the education ladder

and multiply the marginal differences by the corresponding GLH production at each step. The sum of these effects counts as the upper bound measure of the number of individuals who, due to the education they received at Maple Group member colleges, will not have poor health, commit crimes, or claim welfare and unemployment benefits.

Of course, there are other influences that impact an individual's behaviour, and separating these out from the non-economic benefits of education is a challenging task. For the purpose of this analysis, we dampen the results by the 'ability bias' adjustment discussed earlier in this chapter to account for other influences besides education that correlate with an individual's quality of life, such as socioeconomic status and family background. We also apply the same alternative education adjustment used above for the added income.

The final step is to express the results in financial terms by multiplying them by the associated costs per individual, based on data supplied by national studies and surveys. These comprise the overall savings to society. Present value results of the analysis are displayed in Table 2.5 above.

Beekeeper Analogy

A classic example of positive externalities (sometimes called 'neighbourhood effects') in economics is the private beekeeper. The beekeeper's intention is to make money by selling honey. Like any other business, the beekeeper's receipts must at least cover his operating costs. If they don't, his business will shut down.

But from society's standpoint, there is more. Flower blossoms provide the raw input bees need for honey production, and smart beekeepers locate near flowering sources such as orchards. Nearby orchard owners, in turn, benefit as the bees spread the pollen necessary for orchard growth and fruit production. This is an uncompensated external benefit of beekeeping, and economists have long recognised that society might actually do well to subsidise positive externalities such as beekeeping.

Educational institutions are in some ways like beekeepers. Strictly speaking, their business is in providing education and raising people's incomes. Along the way, however, external benefits are created. Learners' health and lifestyles are improved, and society indirectly enjoys these benefits just as orchard owners indirectly enjoy benefits generated by beekeepers. Aiming at an optimal expenditure of public funds, the impact model tracks and accounts for many of these external benefits and compares them to public costs (what taxpayers agree to pay) of education.

Social Investment Outcomes

Table 2.6 has the same structure and interpretation as Table 2.3, with the exception that this analysis provides the overall returns to the UK. Column 3 of Table 2.6 outlines the portion of benefits estimated to be generated by the learners in the absence of Maple Group member colleges. Column 4 is the difference of Columns 2 and 3, and is the stream of cash flows used in generating the outcome metrics. Costs and net cash flows are shown in Columns 5 and 6, respectively. It is also worthy to note that society benefits from the social externalities beyond the 40 years of working life derived from the

learners, though these benefits are minor in comparison to the earnings and productivity effects derived from labour.

Table 2.6: Social Perspective (£ Millions), 2012-13

Year	Gross Social Benefits	Alt Ed	Net Benefits	Costs	Net Cash Flow
0	29.0	2.9	26.1	547.1	-521.1
1	55.6	5.6	50.0	0.0	50.0
2	82.0	8.2	73.8	0.0	73.8
3	106.3	10.6	95.6	0.0	95.6
4	126.9	12.7	114.2	0.0	114.2
5	146.6	14.7	132.0	0.0	132.0
6	162.6	16.3	146.3	0.0	146.3
7	176.4	17.6	158.7	0.0	158.7
8	188.5	18.9	169.7	0.0	169.7
9	199.2	19.9	179.3	0.0	179.3
10	210.2	21.0	189.1	0.0	189.1
11	220.7	22.1	198.7	0.0	198.7
12	231.3	23.1	208.2	0.0	208.2
13	241.5	24.2	217.4	0.0	217.4
14	251.8	25.2	226.6	0.0	226.6
15	262.1	26.2	235.8	0.0	235.8
16	272.4	27.2	245.1	0.0	245.1
17	282.5	28.3	254.3	0.0	254.3
18	292.3	29.2	263.1	0.0	263.1
19	302.2	30.2	271.9	0.0	271.9
20	310.8	31.1	279.7	0.0	279.7
21	319.7	32.0	287.8	0.0	287.8
22	328.2	32.8	295.3	0.0	295.3
23	335.1	33.5	301.6	0.0	301.6
24	342.2	34.2	308.0	0.0	308.0
25	347.9	34.8	313.1	0.0	313.1
26	354.3	35.4	318.8	0.0	318.8
27	359.8	36.0	323.8	0.0	323.8
28	362.7	36.3	326.5	0.0	326.5
29	366.0	36.6	329.4	0.0	329.4
30	368.0	36.8	331.2	0.0	331.2
31	371.1	37.1	334.0	0.0	334.0
32	373.0	37.3	335.7	0.0	335.7
33	371.2	37.1	334.1	0.0	334.1
34	369.8	37.0	332.8	0.0	332.8
35	368.8	36.9	331.9	0.0	331.9
36	368.2	36.8	331.3	0.0	331.3
37	335.6	33.6	302.0	0.0	302.0
38	330.4	33.0	297.3	0.0	297.3
39	269.3	26.9	242.4	0.0	242.4
40	267.9	26.8	241.1	0.0	241.1
41	265.9	26.6	239.3	0.0	239.3
42	263.0	26.3	236.7	0.0	236.7
43	257.6	25.8	231.8	0.0	231.8
44	252.2	25.2	227.0	0.0	227.0
NPV			*£4,922.7*	*£547.1*	*£4,375.5*
B/C ratio					*9.0*
IRR					*23.3%*
Payback (yrs)					*6.4*

As demonstrated in Table 2.6, society benefits from the presence of Maple Group member colleges and their learners. The learners themselves see increased wages, businesses see increased output and profits, and government receives higher tax revenues as a result of the broader tax base. Society also saves money as learners engage in more acceptable social behaviours. For example, a reduction in crime reduces the demand for police, freeing public funds to be allocated to other programmes. It will also save money for individuals in the private sector through reduced property damages and various other victim costs. The present value of these benefits is equal to £4.9 billion.

These benefits are achieved through society's £547.1 million investment in Maple Group member colleges. The net gain to society in present value terms is £4.4 billion. The associated benefit cost ratio is £9.00 for every £1.00 spent and averages a return of 23.3% annually. All costs to society are recovered in 6 years.

Taxpayer Perspective

Benefits and costs under the taxpayer perspective are restricted to the monetary gains and losses accruing to the public (i.e., government) sector. Benefits include increased tax revenues realised as a result of the higher income of learners, and cost savings from social programmes. Whereas total income gains were claimed in the social perspective, only the associated tax revenues are claimed in the taxpayer perspective. The savings that stem from improved learner lifestyles are limited to public sector savings and do not include such things as reductions in private property damages since those savings are not realised by government.

The purpose of this analysis is to treat a public investment as if it were private to analyse whether the government recovers all costs. Even if government did not recover all costs the investment might still be justified under the social perspective since society as a whole is improved by the investment. The case is made much stronger if, by virtue of the investment, the government recovers all costs and can use any excess revenues from the investment to subsidise other publicly desired projects.

Taxpayer Benefits

The same alternative education adjustment applied in the social perspective is applied again in the taxpayer perspective and for the same reason (i.e., taxpayer benefits that would have been realised in the absence of Maple Group member colleges cannot be claimed by the Maple Group).

The present value of the added tax revenue derived from increased learner and business income amounts to £712.2 million, roughly £15.2 million annually over the learners' working life. Avoided social costs extend beyond the learners' working life and into retirement but tend to be small, only amounting to £129.3 million in present value terms in the case of the Maple Group.

Table 2.7: Taxpayer Benefits (£ Thousands), 2012-13

	Present Value	Annually
Increased tax receipts	£712,225	£15,189
Avoided social costs	£129,299	£2,757
Total	*£841,524*	*£17,946*

Source: EMSI.

Taxpayer Costs

Taxpayer costs are limited to pounds withdrawn from local and national treasuries. As per the revenue table in Chapter 1, taxpayer costs amount to £100.9 million.

Taxpayer Investment Outcomes

Table 2.8 has the same structure and interpretation as Table 2.6, with the exception that this analysis provides the returns to the government sector. Column 3 of Table 2.6 outlines the portion of benefits estimated to be generated by the learners in the absence of Maple Group member colleges. The difference between Column 2 and Column 3 represents the stream of cash flows used in generating the outcomes and is reflected in Column 4. Columns 5 and 6 show costs and net cash flows.

Table 2.8: Taxpayer Perspective (£ Millions), 2012-13

Year	Gross Taxpayer Benefits	Alt Ed	Net Benefits	Costs	Net Cash Flow
0	6.3	0.6	5.7	100.9	-95.2
1	10.7	1.1	9.6	0.0	9.6
2	15.0	1.5	13.5	0.0	13.5
3	19.0	1.9	17.1	0.0	17.1
4	22.4	2.2	20.2	0.0	20.2
5	25.7	2.6	23.1	0.0	23.1
6	28.3	2.8	25.5	0.0	25.5
7	30.6	3.1	27.5	0.0	27.5
8	32.6	3.3	29.3	0.0	29.3
9	34.3	3.4	30.9	0.0	30.9
10	36.1	3.6	32.5	0.0	32.5
11	37.9	3.8	34.1	0.0	34.1
12	39.6	4.0	35.7	0.0	35.7
13	41.3	4.1	37.2	0.0	37.2
14	43.0	4.3	38.7	0.0	38.7
15	44.7	4.5	40.2	0.0	40.2
16	46.4	4.6	41.7	0.0	41.7
17	48.0	4.8	43.2	0.0	43.2
18	49.7	5.0	44.7	0.0	44.7
19	51.3	5.1	46.1	0.0	46.1
20	52.7	5.3	47.4	0.0	47.4
21	54.2	5.4	48.7	0.0	48.7
22	55.5	5.6	50.0	0.0	50.0
23	56.7	5.7	51.0	0.0	51.0
24	57.9	5.8	52.1	0.0	52.1
25	58.8	5.9	52.9	0.0	52.9
26	59.8	6.0	53.8	0.0	53.8

27	60.7	6.1	54.7	0.0	54.7
28	61.2	6.1	55.1	0.0	55.1
29	61.7	6.2	55.6	0.0	55.6
30	62.1	6.2	55.9	0.0	55.9
31	62.6	6.3	56.3	0.0	56.3
32	62.9	6.3	56.6	0.0	56.6
33	62.6	6.3	56.3	0.0	56.3
34	62.3	6.2	56.1	0.0	56.1
35	62.1	6.2	55.9	0.0	55.9
36	62.0	6.2	55.8	0.0	55.8
37	56.5	5.7	50.9	0.0	50.9
38	55.7	5.6	50.1	0.0	50.1
39	45.4	4.5	40.8	0.0	40.8
40	45.1	4.5	40.6	0.0	40.6
41	44.8	4.5	40.3	0.0	40.3
42	44.3	4.4	39.9	0.0	39.9
43	43.4	4.3	39.1	0.0	39.1
44	42.5	4.3	38.3	0.0	38.3
NPV			*£841.5*	*£100.9*	*£740.7*
B/C ratio					*8.3*
IRR					*22.7%*
Payback (yrs)					*6.5*

Even under the more narrowly defined scope of the taxpayer perspective, the returns are positive. The public sector recovers the investment of £100.9 million in 6 years and generates an additional £740.7 million (NPV) over the remainder of the learners' working life. The average annual return to the Exchequer is 22.7%, which exceeds many public investments (e.g., public parks) from a financial perspective. The important thing to note with the benefit-cost ratio is that for every public pound invested in Maple Group member colleges, a total of £8.30 is returned. This return can then be used for other investments, meaning that Maple Group member colleges subsidise other public services.

Conclusion

The major stakeholders in Maple Group member colleges see reasonable returns on their investments of time and money. Learners are more productive and realise increased earnings as a result. Businesses that are able to hire trained individuals see increased productivity and profits without having to import labour and strain existing public infrastructure. Society benefits from a broadened tax base, lower crime and other improved long run social behaviours. The increased tax receipts and reduced social burden frees the government to invest in new and more diverse ways.

Chapter 3 : Economic Impact Analysis – England

The Maple Group member colleges promote economic growth in England and in their respective regions in a variety of ways. Each member college is an employer and a buyer of goods and services, while the living expenses of learners from outside of England benefit local businesses. In addition, Maple Group member colleges are a primary source of education to local residents and suppliers of trained workers to industry.

In this section we examine the economic impacts of Maple Group member colleges on the business community each are located in and throughout England through increased consumer spending and enhanced business productivity generated by each member colleges' learners. The impacts reflect the economic relationships among each regions' and England's industries and are calculated using EMSI's proprietary input-output (IO) model. The model uses NUTS3 area data from the Office for National Statistics' (ONS) Supply and Use Tables (SUTs), as well as regional and national industry jobs totals and national sales-to-jobs ratios, to calculate how much each industry purchases from every other industry. The factor of change that occurs from this economic activity is known as the knock-on effect. For more information on the EMSI IO model, please refer to Annex 3.

We express the results in terms of income, as opposed to sales, in order to present a more accurate picture of the Group's actual impacts. While sales tend to be the more common measurement, they do not account for monies that leave the regional economy and therefore overstate the results. Income, on the other hand, only captures the monies remaining in England, providing a more conservative calculation of the Group's true impacts in the region.

The following pages present the results of the analysis as a whole across the group according to the following three effects: 1) impact of staff and member college expenditure, 2) impact of the expenditure of learners who relocate to the individual regions to attend one of the member colleges, and 3) impact of the added skills of former Maple Group member college learners who study or are employed in each region's workforce. Primary emphasis within this document is to display and explain the results across England, although net results are also shown for each region. It must be noted that the total across England is not simply the sum of each region's impacts, but rather represents the unique impacts and knock-on effects of the member colleges across England.

The regions with their respective institutions are broken down as follows:

- *East of England Region:* Hills Road Sixth Form College
- *North West Region:* Cardinal Newman College, Holy Cross College, Sir John Deane's College and Winstanley College

- *South East and London Region:* Peter Symonds College, St. Dominic's Sixth Form College and The Sixth Form College Farnborough
- *West Midlands Region:* King Edward VI College
- *Yorkshire and the Humber Region:* Greenhead College

Impact of Staff and Member College Expenditure

Each Maple Group member college is an important employer in England, providing jobs for a wide range of staff across a number of occupations. In 2012-13, the Maple Group member colleges employed full-time equivalents of 2,465 full-time and part-time staff. Of these, all employees worked and lived within England. Total staff costs at Maple Group member colleges in 2012-13 amounted to £75 million and contributed to England's economy. Staff expenditure on groceries, eating out, clothing, and other household costs also helped support shops and businesses.

In addition to the member college staff, the Maple Group member colleges are buyers of goods and services. In 2012-13, the member colleges spent £32.8 million to support their operations. Much of this expenditure benefited suppliers in England, creating a knock-on effect that generated additional employment and income throughout the economy.

Calculating the Impacts

The impact of Maple Group member colleges' payroll and purchases is subdivided into the following two main effects: the direct effect and the indirect effect. The direct effect comprises the member colleges' payroll and employee benefits, less monies paid to individuals working outside of England. As seen in Table 3.1, this amounted to £75 million. The indirect effect refers to the additional income created in the economy as Maple Group member colleges' employees and suppliers spend money in England to purchase even more supplies and services.

To calculate the indirect effect, we first remove any expenditures occurring outside of England. We calculate this through regional purchase coefficients (RPCs) derived from the IO model, which are based on England's economic characteristics and tell us the proportion of goods and services purchased regionally. For example, an RPC for a particular industry of .90 tells us that 90% of the demand for that industry is purchased from within the region; the remaining 10% is imported into the region. In other words, we can say that 90% of a college's expenditures for that industry stay within the region, whereas the remaining 10% leaks outside the region.

We map these remaining expenditures occurring within England to the 19 top-level industry sectors as classified by the 2007 UK Standard Industrial Classification (SIC), which classifies industries according to the type of economic activity they engage in. We use these same sectors to classify industries in our IO model. In the mapping process, we take general categories provided by the member colleges of their typical expenditures and place them into the top SIC sectors. Figure 3.1 displays this process.

Figure 3.1: College Expenditure Mapping Process

College Spending Categories

- Staff costs

- Teaching, support, and other support
- Administrative and central services
- General education expenditure
- Premises

- Catering, residence, conferences
- Other operating expenses
- Depreciation and interest payable

- Electricity and natural gas

UK SIC Classification

A. Agriculture, Forestry and Fishing
B. Mining and Quarrying
C. Manufacturing
D. Electricity, Gas, Steam and Air Conditioning Supply
E. Water Supply; Sewerage, Waste Management and Remediation Activities
F. Construction
G. Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles
H. Transportation and Storage
I. Accommodation and Food Service Activities
J. Information and Communication
K. Financial and Insurance Activities
L. Real Estate Activities
M. Professional, Scientific, and Technical Activities
N. Administrative and Support Service Activities
O. Public Administration and Defence; Compulsory Social Security
P. Education
Q. Human Health and Social Work Activities
R. Arts, Entertainment and Recreation
S. Other Service Activities
FE College
Consumption

For example, the expenditures of colleges on electricity and natural gas are mapped into the SIC top-level sector *D. Electricity, Gas, Steam and Air Conditioning Supply.* Overall, this mapping process enables us to funnel college expenditures through the IO model's knock-on effect matrix so we can estimate how the spending of the member colleges and their staff affects the output of other industries in England.

Since member colleges' expenditures funnelled through the IO model are in sales terms, the model initially reports the impacts in sales terms. As mentioned above, sales tend to overstate impacts (see textbox), so we convert the sales figures to income. We do this

through value added-to-sales ratios for each top-level sector, also provided by the IO model.

> ### *Sales vs. Earnings example*
>
> *Two visitors spend £50,000 each in the economic region. One visits a local auto dealer and purchases a new luxury automobile. The other undergoes a medical procedure at the local hospital. In terms of direct economic impact, both have spent £50,000. However, the expenditures will likely have very different meanings to the local economy. Of the £50,000 spent for the luxury automobile, perhaps £10,000 remains in the region as salesperson commissions and auto dealer income (part of the economic region's overall earnings), while the other £40,000 leaves the area as wholesale payment for the new automobile, ending up in Japan or the U.S. perhaps. Contrast this to the hospital expenditure. Here perhaps £40,000 appears as physician, nurse, and assorted hospital employee wages (part of the region's overall earnings), while only £10,000 leaves the area to pay for hospital supplies, or to help amortise building and equipment loans. In terms of sales, both have the same impact, while in terms of earnings, the former has one-fourth the impact of the latter.*

Table 3.1 shows the results, equal to £175.4 million in gross impacts attributable to the direct effect of staff costs plus the indirect effect that occurs as the Group's member colleges and staff spend money in England.

Table 3.1: Impact of Staff and Member College Expenditure (£ Thousands), 2012-13

	Total
Total income in England	£1,036,318,592
Direct effect of staff costs	£75,032
Indirect effect	£100,412
Gross total	*£175,443*
Alternative use of funds adjustment	-£48,308
Net total	*£127,136*

Source: EMSI model.

One adjustment must be made to the gross impact before deriving the net impact of staff and member college expenditure. Maple Group member colleges received an estimated 51.9% of funding from sources in England, whether from residents (in the form of donations or tuition fees) or from other private and public sources. Given this phenomenon, a portion of the income that the member colleges create in England's economy is offset by the income that they withdraw from the economy. As such, not all of the impacts generated by Maple Group member colleges and their staff can be considered new monies brought to England.

To determine the 'net' impact of Maple Group member colleges' payroll and purchases, we convert the portion of their funding that originated from English sources to spending. We do this by summing together two specific components. The first component involves the amount of funding the member colleges received from England residents that they could have used instead for their own consumption. Here we use the amount of funding

the member colleges received from the Local Authority and the amount of funding received from the Education Funding Agency that was paid by England taxpayers. We multiply this total local taxpayer funding by the average propensity to consume as reported by the ONS to find the amount they could have used instead for consumption. The second component looks at non-taxpayer sources of member college funding. This includes the amount of tuition paid by learners originating from within England, as well as private (non-governmental) revenue. For the private revenue, we assume that 50% reported by the member colleges comes from local sources. The total amount of these two components amounts to £57.6 million.

Since we assume English residents would have used the £57.6 million for their own consumption, we funnel this spending through the consumption vector of the IO model to calculate the knock-on effect for the individual sectors. Again, this is in sales terms at this point, therefore we convert the amounts to income using the value-added-to-sales ratios for each top-level sector. The result, equal to £48.3 million, allows us to see what income would have been created in England even if the Maple Group member colleges did not exist. Subtracting the £48.3 million in alternative uses of funds from the £175.4 million in gross impacts yields a net impact of £127.1 million in added income in the economy. This value appears in the bottom row of Table 3.1.

A similar process as discussed above was performed for each of the individual regions the member colleges serve. Results for each region are available in Table 3.2. Again, the sum of the individual regions does not equal the total £127.1 million due to differences in knock-on effects and other factors across England compared to the individual regions. Assuming that Maple Group member colleges employ approximately the same number of people and spend approximately the same amount each year, this value may be considered an annual figure.

Table 3.2: Impact of Staff and Member College Expenditure by region (£ Thousands), 2012-13

	Total
Net impact per region	
East of England Region	£12,988
North West Region	£44,763
South East and London Region	£47,575
West Midlands Region	£9,672
Yorkshire and the Humber Region	£12,432
Maple Group total	*£127,136*

Source: EMSI model.

Impact of Learner Expenditure

About 0.2% of learners relocate to England to attend one of the Maple Group member colleges. These learners spend money at shops to buy books and supplies, purchase groceries, rent accommodation, pay for transport, attend sporting events, and so on. The

expenditure of non-resident learners support suppliers and create knock-on effects, thereby generating income and a need for further jobs.

In order to calculate the knock-on effects of non-resident learners, we begin by estimating their gross expenditure in 2012-13. Given the lack of available data from the member colleges, we use estimates prepared by the National Union of Students to find that an average learner moving into England to attend one of the member colleges spends around £4,320 per year for accommodation, personal expenses, and transportation. This £4,320 multiplied by the 0.2% of learners moving into England yields gross expenditures of approximately £198.7 thousand.

Table 3.3: Non-resident Learner Expenditures, 2012-13

Spending Category	Total
Room & board	£2,520
Personal expenses	£1,415
Transportation	£385
Total	*£4,320*

Source: EMSI model.

We then calculate the direct effect by mapping the £198.7 thousand in sales to the industry sectors in the IO model. For example, we place spending for room and board within the SIC top-level sector *L. Real Estate Activities*. We adjust these sales to account for leakage, again using RPCs from the IO model, and convert them to income by applying value added-to-sales ratios. Through this process, we estimate the direct effect of Maple Group member colleges' non-resident learners to be around £95.8 thousand.

The indirect effect comprises the additional income created as the businesses patronised by Maple Group member colleges' non-resident learners also spend money in England. We derive this effect in a similar fashion to the way we found the indirect effect for staff and member college expenditures. That is, we run the same sales mapping of the £198.7 thousand used above through the knock-on effect matrix of the IO model, then again apply value added-to-sales ratios to convert the results to income. This amounts to an indirect effect of non-resident learner expenditures of around £83.6 thousand.

Summing together the direct and indirect effect, we estimate that the spending of Maple Group member colleges' non-resident learners annually adds approximately £179.4 thousand in income to England's economy. Since we are capturing the impacts of only those learners that relocate England (thereby injecting new monies into the economy), we do not have to adjust for the alternative use of funds as we did for the staff and member college expenditures in the previous section. All of the results leading to this impact are presented in Table 3.4.

Table 3.4: Impact of Non-resident Learner Expenditures (£ Thousands), 2012-13

	Total
Total income in England	£1,036,318,592
Direct effect of learner expenditure	£96
Indirect effect	£84
Total	*£179*

Source: EMSI model.

Table 3.5 displays the results of non-resident learner expenditure in each of the individual regions. As can be seen, only two regions, the North West Region and the South East and London Region, had learners relocate from outside of England to their respective regions. The other regions did not generate a non-resident learner expenditure effect.

Table 3.5: Impact of expenditure of non-resident learners by region (£ Thousands), 2012-13

	Total
Net impact per region	
East of England Region	£0
North West Region	£38
South East and London Region	£111
West Midlands Region	£0
Yorkshire and the Humber Region	£0
Maple Group total	*£179*

Source: EMSI model.

Impact of Added Workforce Skills

The Maple Group's strong focus on higher education and workforce development manifests itself at all levels of the member colleges' provisions. In addition to delivering specific training and consultancy solutions to businesses, the member colleges maintain close links with higher education institutions and regional employers in order to target the type of employee training that best meets their growth strategies. All of these services provide valuable resources to businesses and help sharpen the skills of the existing England labour force.

Employee training and development is just one way that employers benefit from the presence of Maple Group member colleges. By working with higher education institutions in preparing learners for additional levels of training and development, as well as aligning their provision with key employment sectors in the regions in terms of the skills employers will require their workers to hold, the Maple Group member colleges help produce the skilled workers that are needed to support England's labour market. Table 3.6 presents the percentage breakdown of the Maple Group member college instructional activity by top-level sector categories, based on their GLH production.

Science and Mathematics comprises the highest percentage of instructional activity (37%), followed by Languages, Literature and Culture (12%) and Arts, Media and Publishing (11%).

Table 3.6: Breakdown of Instructional Activity by Sector, 2012-13

Sector Subject Area	%
Science and Mathematics	37%
Languages, Literature and Culture	12%
Arts, Media and Publishing	11%
Social Sciences	9%
History, Philosophy and Theology	8%
Business, Administration and Law	7%
Preparation for Life and Work	7%
Leisure, Travel and Tourism	3%
Information and Communication Technology	3%
Health, Public Services and Care	2%
Engineering and Manufacturing Technologies	1%
Education and Training	<1%
Agriculture, Horticulture and Animal Care	<1%
Retail and Commercial Enterprise	<1%
Total	*100%*

Source: Data supplied by Maple Group member colleges.

Many of the Maple Group member colleges' learners stay in England to study and eventually enter the labour market, and they are more productive because of the quality education they attained at one of the member colleges. Over time, the skills of former member college learners accumulate, steadily increasing the training level and experience of England's workforce. As the skills embodied by former learners stockpile, a chain reaction occurs: higher learner incomes generate additional rounds of consumer spending, while new skills and training translate to increased business output and higher property income, causing still more consumer purchases and knock-on effects. The sum of all these direct and indirect effects comprises the total impact of the learners' added skills in England's economy.

Note that this total impact of the additional learner skills is unique from the previously discussed impact of member college and staff expenditures. Hypothetically speaking, if Maple Group member colleges were to cease their operations, then the impacts from staff and member college expenditures would immediately disappear. However, the impact from additional learner skills would continue to contribute to the economic growth of England's economy as former learners remain actively engaged in the workforce. While the supply of learner skills would slowly dissipate over time, it would be several years before all learner impacts would fully disappear.

Calculating the Direct Effect

Assigning a monetary value to the added skills acquired by learners still active in England's workforce requires data on the historical enrolments and corresponding

achievement levels of Maple Group member college learners over the past 15-year period. Guided Learner Hours (GLH) are used to determine the achievement levels of the learners, and serve as a proxy for the level of skills they contribute to the workforce. If the member colleges were unable to provide us with historical enrolment data over the past 15-year period, our model projects the historical enrolment for the missing years using data from the available years.

Of course, not all learners remain in the workforce until retirement age, nor do all learners enter the workforce immediately upon exiting one of the member colleges. Other learners leave England and find employment outside the region. In the model, we adjust for these factors by applying yearly attrition rates derived from the probability that individuals will die, retire, or become unemployed over the course of their working careers. To these we combine migration data supplied by the member colleges to estimate the number of learners who leave England over time. This allows us to estimate the net number of former and current Maple Group member college learners still active in England's workforce in the 2012-13 analysis year, as displayed in Table 3.7.

Table 3.7: Number of GLH Still Active in the Workforce in England, 2012-13

Year	Active enrolments, region	Active GLH, region
1999	13,947	4,752,608
2000	14,125	4,820,385
2001	14,305	4,902,729
2002	15,770	5,198,893
2003	15,985	5,329,828
2004	18,370	5,807,931
2005	18,117	5,850,247
2006	18,655	6,024,237
2007	18,315	5,988,987
2008	17,616	5,791,279
2009	15,984	5,363,058
2010	14,415	4,852,373
2011	11,740	3,964,321
2012	7,766	2,642,013
2013	3,046	1,036,149
Total, gross	*218,156*	*72,325,037*
Alternative education adjustment (10%)		(7,232,504)
Substitution effect adjustment (10%)		(7,232,504)
Number of GLH in workforce, net		*57,860,030*

* Numbers may not add due to rounding.
Source: EMSI model.

The next step is to multiply the net number of former learners still working in England by the average number of GLH achieved per learner per year. According to data received from the member colleges, the average GLH per enrolment is around 319 GLH per year. Using this methodology, the estimated number of Maple Group member college GLH in the English workforce comes to 72.3 million (see Table 3.7). These are the GLH that

accumulated in the workforce over the past 15-year period and were still active in the 2012-13 analysis year.

Next we reduce the gross number of active GLH to account for the learners' alternative education opportunities. For this analysis, we assume an alternative education variable of 10%, meaning that 10% of the learner population at Maple Group member colleges would have generated benefits even without the colleges. Since the majority of institutions in the UK receive public funding, we assume learners would have to leave the country to receive a private education or be limited to direct industry training through workforce experience to generate the impacts. A sensitivity analysis of this variable is provided in Chapter 4. The application of the alternative education adjustment reduces by 7.2 million the gross total of GLH in the English workforce.

We make one more adjustment to the gross number of GLH by reducing this figure by 10% to account for substitution effects, *i.e.*, the substitution of out-of-area workers for in-area workers. The reason for this is that if Maple Group member colleges did not exist and there were fewer skilled workers in England, businesses could still recruit and hire some of their employees from outside England. As with the alternative education variable, there is no way to precisely determine how many workers could have been recruited from outside of England if Maple Group member colleges did not exist.[15] With the 10% adjustment, the gross number of GLH is reduced by another 7.2 million (as shown in Table 3.7). The net number of GLH still active in the workforce thus amounts to 57.9 million.

Table 3.8 demonstrates the total direct added income to the economy due to the added skills from former learners of the Maple Group member colleges. First, we find the direct labour income. This calculation begins by taking the average value per GLH of £6.86 and multiplying it by the roughly 57.9 million GLH in the English workforce. This yields a value of £396.7 million in added labour income.

Added to the direct effect on labour income is another £332.5 million in non-labour income, representing the higher property values and increased investment income stemming from the direct income of learners and enhanced productivity of the businesses that employ them. Non-labour income attributable to past learner skills is obtained by disaggregating higher learner income to the industrial sectors of the IO model and then multiplying these amounts by the associated value-added-to-earnings ratios. Summing labour and non-labour income together gives a direct effect of past learner skills equal to approximately £729.2 million in 2012-13.

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[15] For a sensitivity analysis of the alternative education variable and the substitution variable, please see Chapter 4.

Table 3.8: Direct Added Labour Income (£ Thousands), 2012-13

	Total
Direct labour income	£396,720
Direct non-labour income	£332,505
Total direct income	*£729,225*

* Numbers may not add due to rounding.
Source: EMSI model.

Calculating the Indirect Effect

Economic growth stemming from a skilled workforce does not stop with the direct effect. To calculate the indirect effect, we allocate increases in regional income to specific industrial sectors and augment these to account for both demand-side and supply-side multiplier effects.

Demand-side effects refer to the increased demand for consumer goods and services as the higher incomes of skilled workers and their employers are spent in the economy. For example, the increased output of businesses is associated with an increased demand for inputs, which in turn produces a set of economic knock-on effects that are all captured as part of demand-side indirect effects. In the model, these are estimated by converting higher learner income into direct increased industry sales, running these through an indirect knock-on effect matrix, and converting them to income by applying earnings-to-sales and value added-to-sales ratios supplied by the regional IO model. Total demand-side effects amount to £978.2 million in added income to England.

Supply-side effects occur through a process of 'cumulative causation,' or 'agglomeration,' whereby growth becomes in some degree self-perpetuating. The presence of one industry, for example, attracts other industries that use the first industry's outputs as inputs, which produces subsequent rounds of industry growth, and so on.[16] To estimate agglomeration effects, we convert the direct income of past learners to industry value added and apply this to a set of supply-driven knock-on effects provided by the regional IO model. To increase the plausibility of this assumption, the model applies only direct effects associated with industries in the highest stages of development.[17] Total supply-side effects amount to £224.9 million in added income to England.

The sum of demand-side and supply-side effects constitutes the indirect effect of Maple Group member colleges' education, equal to £1.2 billion. Adding these to the direct

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[16] For a more complete discussion of agglomeration and cumulative causation, see Masahisa Fujita, Paul Krugman, and Anthony Venables, *The Spatial Economy: Cities, Regions, and International Trade* (Cambridge: Massachusetts Institute of Technology, 1999).

[17] Parr (1999) describes the following four stages of economic development: primary production, process manufacturing, fabricative manufacturing, and producer services and capital export. The model applies 'development scores' to Parr's stages, *i.e.*, low scores for lower stage sectors and higher scores for higher development sectors. Only those industries with the highest scores are applied to the supply-driven multipliers of the IO model. For additional detail on the use of this approach for classifying industries by industrial stage, see Rutgers *et al*, 2002.

effect yields a grand total of £1.9 billion in added income attributable to the accumulated contribution of former Maple Group member college learners who are currently employed in the English workforce. These results appear in Table 3.9, and total impacts from added workforce skills across each region appear in Table 3.10. Similar to the other impact results, the sum of the individual regions does not sum to the total across the Maple Group given different knock-on effects and percentages of learners remaining in the respective regions.

Table 3.9: Impact of Added Skills (£ thousands), 2012-13

	Total
Total income in England	£1,036,318,592
Direct effect of added skills	£729,225
Indirect effect	£1,203,086
Total	*£1,932,311*

Source: EMSI model.

Note that the total impact of added workforce skills omits the effect of educated workers on innovation and technical progress. To the extent there are such technological gains, and theory suggests that there are, the stated results can be considered conservative.

Table 3.20: Impact of added workforce skills by region (£ Thousands), 2012-13

	Total
Net impact per region	
East of England Region	£156,424
North West Region	£549,118
South East and London Region	£549,173
West Midlands Region	£88,837
Yorkshire and the Humber Region	£74,828
Maple Group total	*£1,932,311*

Source: EMSI model.

Total Impact on the Economy in England

Table 3.11 displays the grand total of Maple Group member colleges' impact on England and across each region in 2012-13. Altogether, the results of this study show that the economic contribution of Maple Group member colleges to the business community in England is around £2.1 billion each year. This is approximately equal to 0.2% of England's total economy and represents roughly 72,704 average wage jobs.

Table 3.11: Total Impact of Maple Group member colleges (£ Thousands), 2012-13

	Total
Net total impact per region	
East of England Region	£169,412
North West Region	£593,920
South East and London Region	£596,859
West Midlands Region	£98,509
Yorkshire and the Humber Region	£87,259
Maple Group total	*£2,059,627*

Source: EMSI model.

Conclusion

These results demonstrate several important points. First, Maple Group member colleges promote economic growth through their operations spending, through the spending of their non-resident learners, and through the increase in productivity as former Maple Group member college learners remain active in the workforce. Second, the impact of added skills in the workforce is by far the largest and most important impact of Maple Group member colleges, stemming from higher incomes of learners and their employers. And third, income in England would be substantially lower without the educational activities of the Maple Group member colleges.

Chapter 4 : Sensitivity Analysis

The purpose of a sensitivity analysis is to 1) see how sensitive the results are to a change in the primary assumptions, and 2) provide the reader with a plausible range wherein the true results will fall. Since we are not providing a statistical analysis of the assumptions, we will not provide a 90% confidence interval, but the concept is similar in that the range generated by the sensitivity analysis gives the most probable outcome.

These types of studies often use assumptions that do not stand up to rigorous peer scrutiny and generate results that overstate benefits. The approach here is to set this study apart from those undertaken strictly for advocacy purposes and provide a true economic audit of the Maple Group's investment viability and economic impacts. The sensitivity analysis covers six variables. For the investment perspective we test the alternative education variable and the discount rate. On the impact side we test the alternative education variables again, value per GLH, substitution effects, alternative use of funds, and learner costs.

Sensitivity Analysis of Investment Assumptions

It is worth noting that while the alternative education variable is an assumption based on the educational potential of the learners in the absence of public funding, the discount rate comes to us from *The Green Book*. These rates are calculated by HMS Treasury, but they do vary by individual and are closely related to an entity's risk aversion. So, while these data are published and incorporate the public's willingness to accept risk, we still provide a sensitivity analysis since different regions and sub-cultures in the UK may have different risk tolerances.

Learner Perspective

The alternative education variable does not affect the learners' stream of cash flows from Table 2.3 and thus is not included here. However, the discount rate for learners will vary far more than it will for the social and taxpayer perspectives. As can be seen, Table 4.1 below alters the assumed 'base case' values for the discount rate by first reducing it by 25% and 50% and then increasing it by the same.

Table 4.1: Learner Perspective Discount Rate

	-50%	-25%	Base Case	25%	50%
Discount Rate	1.8%	2.6%	3.5%	4.4%	5.3%
NPV (£ millions)	£2,050.1	£1,635.2	£1,311.8	£1,057.4	£855.5
B/C	9.1	7.5	6.2	5.2	4.4

Source: EMSI.

The IRR is not shown here because it is unaffected by the discount rate (see E.J. Mishan 1976). As the discount rate is varied, the NPV ranges from £0 thousand to £0 thousand and the B/C from 0.0 to 0.0. Even with a much higher discount rate, learners still see a return above the threshold of 1.0, receiving £0.00 for every pound of their investment.

Social Perspective

As can be seen in Table 4.2, reducing the alternative education variable increases the returns since more of the benefits may be claimed by the Maple Group. Similarly, reducing the discount rate increases the net present value and the benefit/cost ratio since future dollars are not discounted as heavily.

Table 4.2: Social Perspective Alternative Education Variable

	-50%	-25%	Base Case	25%	50%
Alternative Education Variable	5.0%	7.5%	10.0%	12.5%	15.0%
NPV (£ millions)	£4,649.0	£4,512.3	£4,375.5	£4,238.8	£4,102.1
B/C	9.5	9.2	9.0	8.7	8.5
IRR	24.2%	23.8%	23.3%	22.8%	22.3%

Source: EMSI.

Table 4.3: Social Perspective Discount Rate

	-50%	-25%	Base Case	25%	50%
Discount Rate	1.8%	2.6%	3.5%	4.4%	5.3%
NPV (£ millions)	£6,612.8	£5,357.4	£4,375.5	£3,600.4	£2,983.0
B/C	13.1	10.8	9.0	7.6	6.5

Source: EMSI.

If our assumption of the alternative education variable is off by 50% in either direction, the expected social NPV will range between £4.4 billion and £4.4 billion. The associated B/C ranges between 9.0 and 9.0, while the IRR occurs within 23.3% and 23.3%. The magnitude of the range is smaller than that of the discount rate, implying that the results are less sensitive to the alternative education variable. When varying the discount rate between plus or minus 50% of the base case, the NPV is greater than £3 billion and less than £6.6 billion, while the B/C is between 6.5 and 13.1.

Taxpayer Perspective

The taxpayer sensitivity analysis shows similar trends to those of the social perspective, though with a smaller magnitude of variance in results since the benefits are a subset of those seen in the social analysis.

Table 4.4: Taxpayer Perspective Alternative Education Variable

	-50%	-25%	Base Case	25%	50%
Alternative Education Variable	5.0%	7.5%	10.0%	12.5%	15.0%
NPV (£ millions)	£787.4	£764.0	£740.7	£717.3	£693.9
B/C	8.8	8.6	8.3	8.1	7.9
IRR	23.6%	23.2%	22.7%	22.2%	21.7%

Source: EMSI.

Table 4.5: Taxpayer Perspective Discount Rate

	-50%	-25%	Base Case	25%	50%
Discount Rate	1.8%	2.6%	3.5%	4.4%	5.3%
NPV (£ millions)	£1,119.3	£906.9	£740.7	£609.4	£504.7
B/C	12.1	10.0	8.3	7.0	6.0

Source: EMSI.

As seen above, taxpayer investments in Maple Group member colleges are still viable investments with extremely high discount rates and large alternative education adjustments. Under the most conservative conditions, the alternative education variable will generate NPV, B/C, and IRR of £740.7 million, 8.3, and 22.7%, respectively. Under the most favourable assumptions on the alternative education variable, taxpayers will see a NPV of £740.7 million, B/C of 8.3, and IRR of 22.7%. Again the results are more sensitive to the discount rate, with the NPV ranging from £504.7 million to £1.1 billion and the B/C ratio from 6.0 to 12.1.

Sensitivity Analysis of Impact Assumptions

Impact of Added Workforce Skills

Three assumptions feed into the primary impact measure of the impact of added workforce skills. The alternative education variable accounts for the growth in impacts that would have been generated in England even if Maple Group member colleges had never been established. The value per GLH, though calculated based on regional earnings, may vary from year to year and is highly dependent on current economic conditions. The substitution effect assumes that some of the productivity in England would have occurred without the member colleges through the importation of non-local labour. This is in contrast to the alternative education variable, where local labour is able to obtain some education in the absence of Maple Group member colleges.

Table 4.6: Added Workforce Skills Assumptions

	-50%	-25%	Base Case	25%	50%
Alternative Education Variable	5.0%	7.5%	10.0%	12.5%	15.0%
Impact (£ thousands)	£2,039,662	£1,985,987	£1,932,311	£1,878,636	£1,824,961
Value Per GLH	£2.57	£5.14	£6.86	£8.57	£12.86
Impact (£ thousands)	£724,617	£1,449,234	£1,932,311	£2,415,389	£3,623,084
Substitution Variable	5.0%	7.5%	10.0%	12.5%	15.0%
Impact (£ thousands)	£2,039,662	£1,985,987	£1,932,311	£1,878,636	£1,824,961

Source: EMSI.

Since the alternative education variable and substitution effects are the same rate, they move together. More interesting is the sensitivity of the results to the value per GLH. The magnitude of change this variable has on the final results is large, demonstrating this variable's calculation is crucial to the analysis. It also proves why it is so critical to use regional rather than national earnings figures that are also weighted by the learner body demographics.

Impact of Staff and Member College Expenditure

We only perform a sensitivity analysis on one variable in regards to the operations of the Maple Group member colleges. The portion of the member colleges' revenues received by sources in England (e.g., tax revenues directed to the member colleges, resident private donations, and the portion of national taxes derived from sources) may have been spent in a variety of ways, with different knock-on effects associated with that spending.

Table 4.7: Staff and Member College Expenditure Alternative Use of Funds

	-50%	-25%	Base Case	25%	50%
Alternative Use of Funds	26.0%	39.0%	51.9%	64.9%	77.9%
Impact (£ thousands)	£151,290	£139,213	£127,136	£115,059	£102,982

Source: EMSI.

Table 4.7 varies the amount of revenues received by the member colleges from sources in England. In the base case scenario, 51.9% of the member colleges' revenues were derived from sources in England. The larger the percentage, i.e. the more revenues derived from sources in England, the lower the staff and member college expenditure impact will be since a larger portion of the member colleges' spending is not new money in the economy.

Impact of Learner Expenditure

The sensitivity analysis on this variable simply alters the additional costs the learners incur through their college attendance. We vary the costs of books and supplies, room and board, personal expenses, and transportation as reported in Table 3.3. Here, if costs

increase and the volume of non-resident learners remain unaffected, impacts will rise since raw injections of money into England generate increased earnings.

Table 4.8: Learner Expenditures

	-50%	-25%	Base Case	25%	50%
Learner Costs	£2,160	£3,240	£4,320	£5,400	£6,480
Impact (£ thousands)	£90	£135	£179	£224	£269

Source: EMSI.

Conclusion

Even if the most conservative assumptions for each of the variables pertaining to the impacts of the Maple Group were adopted, the total impact on England's economy would still be £749.4 million, equivalent to 26,454 average wage jobs.

Based on this sensitivity analysis, the returns to learners, the public, and the government are reasonable. They even remain above investment profitability thresholds when the most conservative assumptions are in place. Similarly, the economic impact analysis continues to generate modest results even when limiting by half the benefits that the Maple Group can claim.

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Annex 2: Glossary of Terms

Alternative education

A 'with' and 'without' measure of the percent of learners who would still be able to avail themselves of education if the publicly funded colleges and universities in the UK did not exist. An estimate of 10%, for example, means that 10% of learners do not depend directly on the existence of the college in order to obtain their education.

Alternative use of funds

A measure of how monies that are currently used to fund the college might have been if the college did not exist.

Asset value:

Capitalised value of a stream of future returns. Asset value measures what someone would have to pay today for an instrument that provides the same stream of future revenues.

Attrition rate:

Rate at which learners leave the workforce due to such factors as out-migration, retirement, or death.

Benefit/cost ratio:

Present value of benefits divided by present value of costs. If the benefit/cost ratio is greater than one, then benefits exceed costs and the investment is feasible.

Demand

Relationship between the market price of education and the volume of education demanded (expressed in terms of enrolment). The law of the downward-sloping demand curve is related to the fact that enrolment increases only if the price (learner tuition fees) is lowered, or conversely, enrolment decreases if price increases.

Direct effect

Jobs and income directly generated by the colleges and their learners.

Discounting:

Expressing future revenues and costs in present value terms.

Economics:

Study of the allocation of scarce resources among alternative and competing ends. Economics is not normative (what ought to be done), but positive (describes what is, or how people are likely to behave in response to economic changes).

Elasticity of demand

Degree of responsiveness of the quantity of education demanded (enrolment) to changes in market prices (learner tuition fees). If a decrease in fees increases total revenues, demand is elastic. If it decreases total revenues, demand is inelastic. If total revenues remain the same, elasticity of demand is unitary.

Externalities:

Impacts (positive and negative) for which there is no compensation. Positive externalities of education include improved social behaviours such as lower crime, reduced unemployment, and improved health. Colleges do not receive compensation for these benefits, even though education statistically correlates with improved social behaviours.

Gross Domestic Product:

Measure of the final value of all goods and services produced. Alternatively, GDP equals the combined incomes of all factors of production, e.g., labour, land, and capital. These include wages, salaries, profits, rents, and other.

Indirect effect

Jobs and income that result from the direct spending of the colleges and their learners.

Input-output analysis:

Relationship between a given set of demands for final goods and services, and the implied amounts of manufactured inputs, raw materials, and labour this requires. In an educational setting, as colleges pay staff and spend money for supplies in the local economy, they also generate earnings in all sectors of the economy, thereby increasing the demand for goods, services, and jobs. Moreover, as learners enter or rejoin the workforce with added skills, they earn higher salaries and wages. In turn, this generates more consumption and spending in other sectors of the economy.

Internal rate of return:

Rate of interest which, when used to discount cash flows associated with investing in education, reduces the net present value to zero (i.e., where the present value of revenues accruing from the investment are just equal to the present value of costs incurred). This, in effect, is the breakeven rate of return on investment since it shows the highest rate of interest at which the investment makes neither a profit nor a loss.

Labour income

Income which is received as a result of labour, e.g., wages.

Multiplier:

Measure of overall local earnings per pound of college earnings (i.e., on- and off-campus earnings divided by on-campus earnings). Multiplier effects are the result of in-area spending for goods and services and of everyday spending by college staff. The analysis also includes added local earnings attributable to past learners still active in the workforce. The local economy is larger because of learner skills, added spending associated with higher learner incomes, and enlarged output of industries where past learners are employed.

Net cash flow: Benefits minus costs, *i.e.*, the sum of revenues accruing
                                  from an investment minus costs incurred.

Net present value: Net cash flow discounted to the present. All future cash
                                  flows are, in this way, collapsed into one number, which,
                                  if positive, indicates feasibility. The result is expressed as a
                                  monetary measure.

Non-labour income   Income which is received from investments (such as rent,
                                  interest, and dividends) and transfer payments (payments
                                  from governments to individuals).

Opportunity cost: Benefits forgone from alternative B once a decision is
                                  made to allocate resources to alternative A. For example,
                                  if an individual chooses not to attend college, he or she
                                  forgoes higher future earnings associated with further
                                  education. The benefit of education, therefore, is the
                                  'price tag' of choosing not to attend college.

Payback period   Length of time required to recover an investment – the
                                  shorter the period, the more attractive the investment.
                                  The formula for computing the payback period is:

                                  Payback period = cost of investment/net return per
                                  period.

Annex 3: EMSI Input-Output Model

Introduction and Data Sources

EMSI's UK Regional Input-Output model represents the economic relationships among a region's industries, with particular reference to how much each industry purchases from each other industry. Using a complex, automated process, we can create regionalised models for any geographic area comprised of NUTS 3 areas.

Our primary data sources are the following:

1. Regional and national jobs-by-industry totals, and national sales-to-jobs ratios (derived from EMSI's industry employment and earnings data process).

2. The Office for National Statistics' (ONS) Supply and Use Tables (SUTs).

Creation of the Z Matrix

The SUTs show which industries make or use which commodity types. These two tables are combined to replace the industry-commodity-industry relationships with simple industry-industry relationships. This is called the national 'Z' matrix, which shows the total amount (£) each industry purchases from others. Industry purchases run down the columns, while industry sales run across the rows.

Table 0.1: Sample Z matrix (£ millions)

	Industry 1	*Industry 2*	*. . .*	*Industry 645*
Industry 1	3.3	1,532.5	. . .	232.1
Industry 2	9.2	23.0	. . .	1,982.7
. . .	. . .	. . .	. . .	. . .
Industry 645	819.3	2,395.6	. . .	0

In looking at the table above, the value 1,532.5 means that Industry 2 purchases £1,532,500,000 worth of commodities and/or services from Industry 1. In other words, the whole table is basically an economic double-entry accounting system, configured so that all money inflows have corresponding outflows elsewhere. All regular industries (such as 'oil and gas exploration,' 'machinery manufacturing,' 'supermarkets,' 'hospitals,' and so on) are captured in the Z matrix.

Disaggregation of the Z Matrix

The initial national Z matrix is then 'disaggregated' (or *extended*) from around 120 industries to approximately 645 industries. The disaggregation is performed by using probability matrices that allow us to estimate industry transactions for the more detailed sectors based on the known transactions of their parent sectors. The probability matrix is created from detailed EMSI industry earnings data, which are available for the approximately 645 industries and generated using a separate process.

Creation of the A Matrix

The national disaggregated 'Z' matrix is then 'normalised' to show purchases as percentages of each industry's output rather than total £ amounts. This is called the national 'A' matrix.

Table 0.2: Sample 'A' matrix

	Industry 1	*Industry 2*	*. . .*	*Industry 645*
Industry 1	.001	.112	. . .	.035
Industry 2	.097	0	. . .	.065
. . .	. . .	. . .	. . .	. . .
Industry 645	.002	.076	. . .	0

Each cell value represents the percentage of a column industry's total input purchases that goes toward purchasing inputs from each row industry. Thus, the cell containing .112 means that Industry 2 spends 11.2% of its total input purchases to obtain inputs from Industry 1.

Regionalisation of the A Matrix

To create a regional input-output model so that each region can be analysed on its own, we regionalise the national A matrix using that region's industry mix. The core regionalisation method is based on the work of University of West England economist A.T. Flegg[18] and uses cross-industry location quotients. In general, location quotients

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[18] Flegg, A.T. and C.D. Webber, 2000. 'Regional Size, Regional Specialisation and the FLQ Formula,' **Regional Studies** 34(6): 563-569; Flegg, A.T. and C.D. Webber, 1997. 'Regional Size, Industrial Location and Input-Output Expenditure Coefficients,' **Regional Studies** 32(5):435-444; Flegg, A.T. and C.D. Webber, 1997. 'On the Appropriate Use of Location Quotients in Generating Regional Input-Output Tables: Reply' **Regional Studies** 31(8): 795-805; Flegg, A.T. and C.D. Webber, 1994. 'On the Appropriate Use of Location Quotients in Generating Regional Input-Output Tables' **Regional Studies** 29(6): 547-561.

provide regional insight by determining the proportion of regional employment in a specific sector compared to the proportion of national employment in that same sector. In an effort to produce the best estimates, we calibrated the Flegg location quotients (FLQs) in our model with respect to 2007 data from the Scottish Government Input-Output Model. We calculate the FLQs using the following equation:

$$FLQ_{i,j} = \left(\frac{J_i^R / J_i^N}{J_j^R / J_j^N} \right) \times \left(\log_2 \left(1 + \frac{\sum J^R}{\sum J^N} \right) \right)^{0.1}$$

Where:

J = Jobs
i = row industry
j = column industry
R = Region
N = Nation
0.1 = Calibration

We create a separate matrix for the FLQs of all industries, as displayed below in Table 3. For example, the cell containing the FLQ of .12 was calculated by using Industry 1 as the row industry (or *i* in the equation above) and Industry 2 as the column industry (or *j* in the equation above).

Table 0.3: Sample FLQ matrix

	Industry 1	*Industry 2*	*. . .*	*Industry 645*
Industry 1	1	.12	. . .	.47
Industry 2	.98	1	. . .	.09
. . .	. . .	. . .	. . .	. . .
Industry 645	.20	.76	. . .	1

One other important aspect of the FLQ matrix is that we can use each FLQ as a regional purchase coefficient (RPC). RPCs are useful in estimating the percentage of industry demand that is met by purchases from other industries within the region. In this way, we can see how much money for industry purchases stays within the region and how much leaks out of the region.

Since the FLQ matrix has the same dimensions as the A matrix, it can be used to scale the national A matrix to the region using the Hadamard (i.e., element-by-element) product. The result is the regionalised A matrix, represented by the following equation:

$$A^R = A^N \otimes F^R$$

Where:

$\otimes$ = Hadamard multiplication
A^N = UK IO coefficients matrix
F^R = FLQ matrix
A^R = Regional IO coefficients matrix

The A-matrix regionalisation process is automated for any given region for which industry data are available. Although partially derived from national figures, the regional A matrix offers a best possible estimate of regional values without resorting to costly and time-consuming survey techniques, which in most cases are completely infeasible.

Creating Knock-on Effects and Using the A Matrix

Finally, we convert the regional A matrix to a regional B matrix using the standard Leontief inverse:

$$B^R = (I - A^R)^{-1}$$

The B matrix consists of inter-industry sales knock-on effects, which can be converted to jobs or earnings knock-on effects using per-industry jobs-to-sales or earnings-to-sales ratios. The resulting tables and vectors from this process are then used in the actual end-user software to calculate regional requirements, calculate regional economic base, estimate sales knock-on effects, and run impact scenarios.

DEMONSTRATING THE VALUE OF THE MAPLE GROUP OF LEADING
SIXTH FORM COLLEGES
Analysis of the Social and Economic Impact of Learning
June 2014

Explanatory examples for certain terms and concepts

This document is not intended as a definition of the economic theory or specifics of the analysis, all of which can be found in the main report. For a helpful Glossary of Terms, please see Annex 2 of the main report.

Opportunity cost

When a learner attends the college, they pay tuition fees that are clearly part of their investment in their education. But there is another more significant part of their investment in the value of the work they could otherwise be doing. For example, if the learner had decided not to go to the college, then they may have taken a job at £7.50/hr that they now cannot take. This £7.50/hr is an opportunity cost that is just as much a cost as the tuition fees they pay, and so is also part of the learner's investment in their education.

Investment analysis using present value and discounting

To assess learner and taxpayer returns, we look at the present costs (meaning costs right now) and compare them to future benefits. Since these benefits occur in the future, in order to directly compare them to the costs right now, we have to "discount" them to current values. The discount rate reflects the reality that a pound today is worth more to you than a pound tomorrow. You might rather have £5,000 in 30 years than £500 today, but at some point you would rather take a lower amount today than a higher amount in the future because the lower amount today would actually be worth more than the higher amount in the future.

As an example of how we use the discount rate and present value, let's say a learner spends a total of £50,000 on tuition and opportunity costs for attending the college this year. Their investment (i.e. costs) will increase their earnings by £5,000 per year for the next 30 years. Many would take this to mean that they will earn an extra £150,000 over the next 30 years. Therefore they would say that their net value (earnings – costs) would be £100,000.

However, £5,000 in 30 years is not worth the same as £5,000 today, so we need to discount it back into today's terms. If we were to use a discount rate of 5%, then £5,000 one year from now would be worth £4,762 today and the £5,000 in 30 years would be worth £1,157 today. Thus the present value (i.e. today's value) of the future increased earnings would not be £150,000, but rather £76,862. Taking it one step further, the net present value (earnings – costs) is now £26,862 instead of £100,000.

Rate of return

Otherwise known as return on investment, the rate of return reflects the annual returns. For example, the rate of return on a bank account might be 2%. This means the bank account will keep returning at this rate as long as the money is in there; it will not be just a one-time return of 2%. Similarly, the increase to future earnings from being better educated and the additional benefits education brings will have an annual return to learners, society, and taxpayers.

Positive externality

A classic example that demonstrates positive externalities is the private beekeeper. The beekeeper's intention is to make money by selling honey. Like any other business, the beekeeper's receipts must at least cover their operating costs. If they don't, the business will shut down. But from society's standpoint, there is more. Flower blossoms provide the raw input bees need for honey production, and smart beekeepers locate near flowering sources such as orchards. Nearby orchard owners, in turn, benefit as the bees spread the pollen necessary for orchard growth and fruit production. This is an uncompensated external benefit of beekeeping, and economists have long recognised that society might actually do well to subsidise positive externalities such as beekeeping.

Educational institutions are in many ways like beekeepers. Strictly speaking, their business is in providing education and raising the incomes of learners. Along the way, however, external benefits are created. Learners' health and lifestyles are improved, and society indirectly enjoys these benefits just as orchard owners indirectly enjoy benefits generated by beekeepers.

Tax base

In the study we refer to the tax base as the amount of earnings that are subject to taxation. For example, if before attending college a learner earned £20,000, then that £20,000 represents the tax base. If after attending the college the learner could command a salary of £30,000, then we can say that the tax base was increased by £10,000.

Increased output of local employers

Let's say an accounting trainee works at a firm of accountants and they charge fees of £40,000 to clients for the trainee's work. If the trainee then joins the local college as a learner and gains a chartered accountancy qualification, the local employer benefits because now their charge out rate can be much higher –perhaps £70,000. The employer's direct output has increased. But in addition they are also doing more business, meaning they are spending more which increases the output of other local businesses.

Increased output of local suppliers

Local suppliers feel the benefits in many ways from the college. For one, the college buys certain goods and services from them, such as pens and paper from the local stationary store or sandwiches from a nearby café for an employee lunch. Furthermore the college pays its employees, who then go out and spend their salaries at their favourite restaurants and shops. Learners attending the college also spend money at local suppliers for school items as well as at

their neighbourhood pubs and markets. All of this spending means that local suppliers see increased business which increases their overall outputs.

Learner expenditure

The economic impacts of learning take place at a regional level. We can then say that a learner living in the same town as the college would presumably have rented a home, purchased food and so forth in much the same way as they would have had they decided to not attend the college. For this reason, we look only at the local spending of learners who have moved to the region in order to attend college. Without the college, these learners most likely would not have moved to the region and so would not be spending their money for food and so forth on local businesses. The impacts of these learner expenditures are therefore those that can be attributed to the college's presence in the region.