Economic Drivers & Growth Phase 3: Appendices

11 August 2005

Private and Confidential

Appendix 1 – Scenarios: Headline Assumptions and Outputs

Figure A1.1 below summarises the key outputs and features of the range of scenarios considered in the various phases of work undertaken by DTZ. Scenarios from the first phase of DTZ work have not been included as they were based on a larger South Hampshire sub-region and are therefore not compatible with the later phases. Further details of the modelling methodology are included in Appendix 2.

Figure A1.1 Overview of Considered PUSH Growth Scenarios

Scenario	Avg. Annual GVA Growth (2002-2026)	Avg. Annual Prod. Growth (2002-2026)	Notes	Employment Projections						
				2002	2006	2011	2016	2021	2026	2006-2026
Phase 2										
2.1.1	2.5%	1.8%	• Flat GVA growth rate. • Variation in productivity growth figure for 2002. • Productivity growth rate increases by 3% p.a.	430,900	450,900	472,600	489,500	500,000	502,500	51,600
2.1.2	3.0%	2.1%		430,900	455,900	483,700	506,200	521,200	526,800	71,000
2.1.3	3.5%	2.4%		430,900	460,900	495,000	523,300	543,300	552,100	91,300
Phase 3 Stage 1										
3.1.1a	2.5%	2.0%	• Development of Phase 2 model • Flat GVA growth rate • Alternative productivity scenarios based on target rates identified by PUSH[1] • Productivity scenarios achieved through variation of annual increases in productivity growth rate.	430,900	450,500	470,800	484,600	489,900	484,700	34,200
3.1.1b	2.5%	2.3%		430,900	450,000	467,600	475,700	471,300	451,900	1,900
3.1.1c	2.5%	2.5%		430,900	449,600	465,600	470,100	459,700	431,300	-18,300
3.1.2a	3.0%	2.0%		430,900	456,200	485,600	511,100	531,400	544,700	88,500
3.1.2b	3.0%	2.3%		430,900	455,500	481,800	501,000	510,400	507,700	52,200
3.1.2c	3.0%	2.5%		430,900	455,100	479,500	494,700	497,400	484,600	29,600
3.1.3a	3.5%	2.0%		430,900	462,000	501,100	539,700	577,000	611,800	149,800
3.1.3b	3.5%	2.3%		430,900	461,200	496,800	528,300	553,400	570,200	109,000
3.1.3b	3.5%	2.5%		430,900	460,700	494,200	521,200	538,800	544,200	83,500

[1] Productivity scenarios – 2.0% Long term HM treasury forecast for UK, 2.3% SEERA/Experian forecast for SE (2.27%), 2.5% based on Deloitte high forecast for SEEDA.

Figure A1.1 Overview of Considered PUSH Growth Scenarios

Scenario	Avg. Annual GVA Growth (2002-2026)	Avg. Annual Prod. Growth (2002-2026)	Notes	Employment Projections						
				2002	2006	2011	2016	2021	2026	2006-2026
Phase 3 Stage 2 (Variants of lead scenario 3.1.2b)										
3.2.1a	3.00%	2.3%	• Representation of 3.1.2b • Flat GVA growth rate	430,900	455,500	481,800	501,000	510,400	507,700	52,200
3.2.1b	3.00%	2.3%	• 3.2.1a with revised modelling approach to productivity[2]	430,900	453,700	475,300	490,300	500,500	507,600	53,900
3.2.2a	3.12%	2.3%	• Stepped GVA growth[3]	430,900	451,100	471,400	490,100	505,500	515,100	64,000
3.2.2b	3.12%	2.3%	• 3.2.2a with revised modelling approach to productivity[2]	430,900	449,300	465,000	479,700	495,600	515,000	65,700
3.2.3a	3.07%	2.3%	• Straight line GVA growth[4]	430,900	451,100	473,500	492,200	505,100	509,700	58,600
3.2.3b	3.06%	2.3%	• 3.2.3a with revised modelling approach to productivity[2]	430,900	449,300	467,000	481,300	494,200	507,900	58,600

[2] A variation to the way productivity is handled in the model was incorporated. Initial modelling approach included the productivity growth rate increasing by a fixed percentage rate year on year (and hence productivity growth rates increased at an ever-increasing rate). The revised model retained the key assumption of ever increasing productivity growth, but at an ever-decreasing rate.

[3] PUSH provided the following GVA growth rate targets (2.75%pa 2006-11, 3.0%pa 2011-16, 3.25%pa 2016-21, 3.5%pa 2021-26).

[4] Gradual straight-line GVA growth, rising from 2.75%pa to 3.36%pa (3.33% in variant b). 2026 GVA growth rate adjusted to limit employment growth to target level.

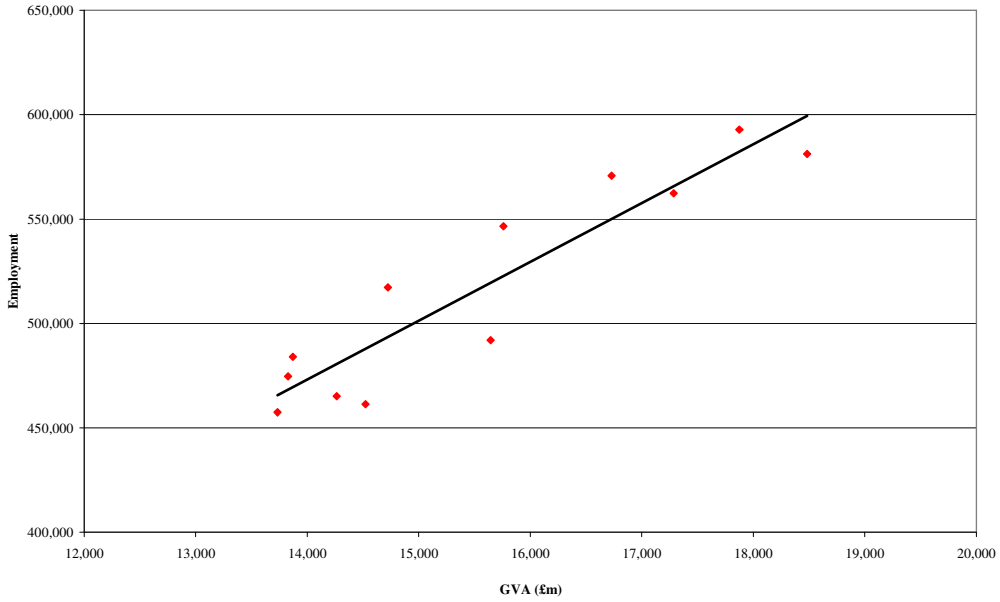
Appendix 2 – Modelling Methodology

Model Background

This appendix explains the methodology behind the DTZ forecasting model developed for PUSH. It discusses the basic mechanics of the model and the adaptations made since the first round of forecasting. The model forecasts employment and productivity on the basis of Gross Value Added (GVA) following a target growth trajectory. The model was developed after referring to several different sources of data and analysing the relationships between the three variables (GVA, employment and productivity). As GVA is broadly the product of employment and productivity, the model requires the understanding of the relationship between a changing level of GVA and the changes in employment and productivity that result from this.

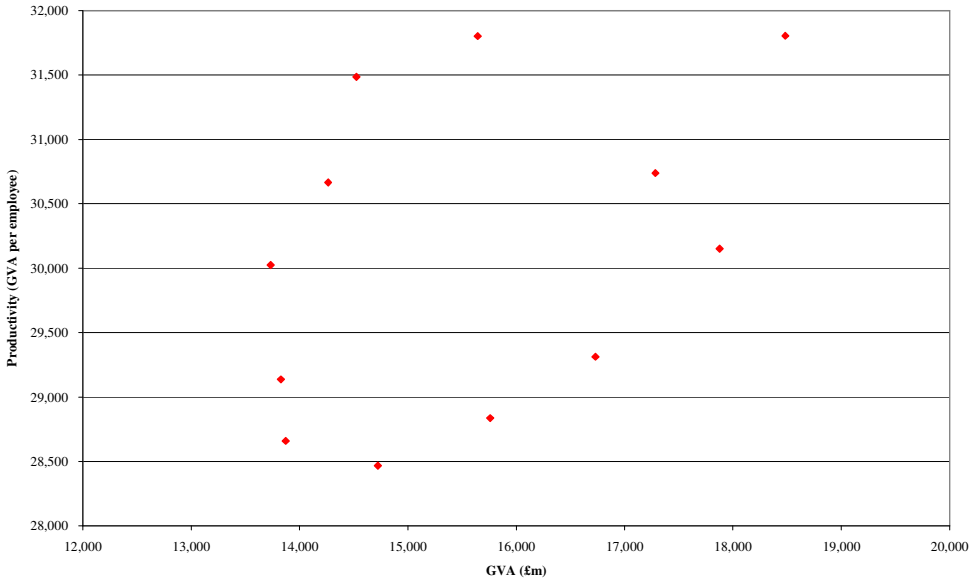
Initially several models were developed to further understand the relationships between GVA, employment and productivity, using data from the previous eleven years. The two charts below show the level of employment against GVA and the level of productivity against GVA for the period 1990-2001.

Figure A2.1: Employment Against GVA, 1990-2001



Source: DTZ Locus

Figure A2.2: Productivity Against GVA, 1990-2001



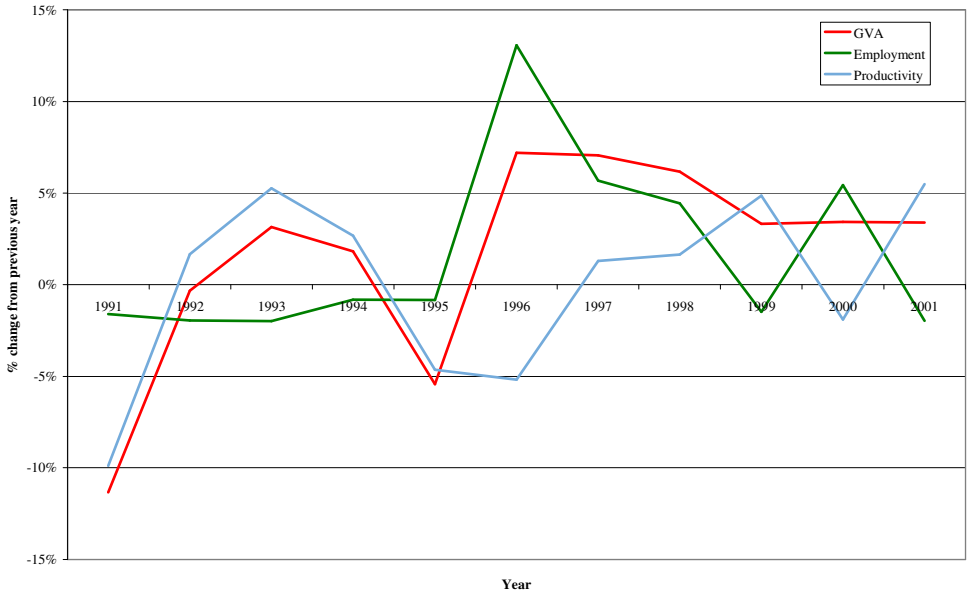
Source: DTZ Locus

Figure A2.1 suggests a strong positive correlation (shown by the trend line) between GVA and employment. Figure A2.2, however, shows that there is no clear correlation between GVA and productivity.

Yet there is a problem with simply using employment and GVA data to form a forecast model, as this discounts the effect of productivity. GVA change is brought about in a dynamic situation where employment and productivity are both changing and contributing concurrently. This discounts the idea of using a GVA-employment trend to forecast future economic impacts, as this assumes productivity being a dependent variable simply calculated from GVA and employment, whereas in reality it is an independent variable.

To appropriately demonstrate the importance of seeing employment and productivity as related but fundamentally retaining some independence of the other we looked at the relationship between the changes in GVA, employment and productivity in percentage terms over the period 1991-2001. Figure A2.3 plots the annual percentage change for each of the three variables.

Figure A2.3 Percentage Changes in GVA, Employment and Productivity, 1991-2001



Source: DTZ Locus

Figure A2.3 demonstrates the fact that a change in GVA does not simply depend on a change in employment, but that changes in productivity can also lead to GVA change, for example, between 1991 and 1994 both GVA change and productivity change follow a similar course. This chart also shows the complexity of the situation, with both employment and productivity combining to produce changes in GVA; this also shows that either variable can drive GVA change. Obviously the dynamic of this relationship raises problems for creating a model, as there is little correlation between employment and productivity historically to suggest a future trend.

Key Model Assumptions

Thus we have made the assumption that growth in GVA over the next twenty-five years will come about through increases in both employment and productivity. However, we have made the broad assumption that, relatively speaking, employment is the main driver behind GVA growth over the short to medium term, but that productivity improvements in the sub-regional economy become increasingly more important for driving GVA growth in the medium to long term. This reflects consensus views of industrial sector change, particularly in the wider regional economy, with a move towards higher value added, higher productivity sectors.

With this broad assumption in place, we have created a model with the following key assumptions:

- GVA increases over time.
- The GVA growth trajectory is set outside the model.

- Productivity grows at an increasing rate over time.
- The productivity growth rate is set outside the model.
- Two approaches to productivity have been used under the range of scenarios:
  - The productivity growth rate increases by a fixed percentage rate each year (hence increases at an ever increasing rate); and
  - The productivity growth rate increases by a decreasing percentage each year (hence increases at an ever decreasing rate).

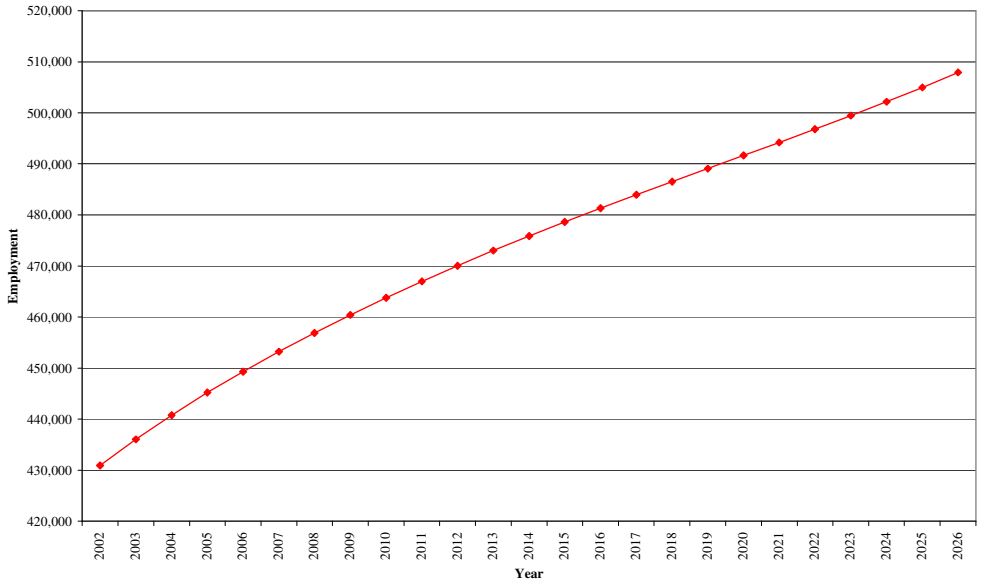
- Employment is included as a dependent variable, calculated using the formula GVA/productivity.

Broadly speaking the result of our model is to give an employment figure that gradually slows in its rate of change, and a productivity figure that gradually increases in its rate of change.

With the change in definition of the South Hampshire sub-region the model was amended. Ward level Annual Business Inquiry (ABI) employment data for the period 1998 to 2002 was used as the basis for the employment element of the model. Following the release of more recent ABI data 2002 was set as the base year.

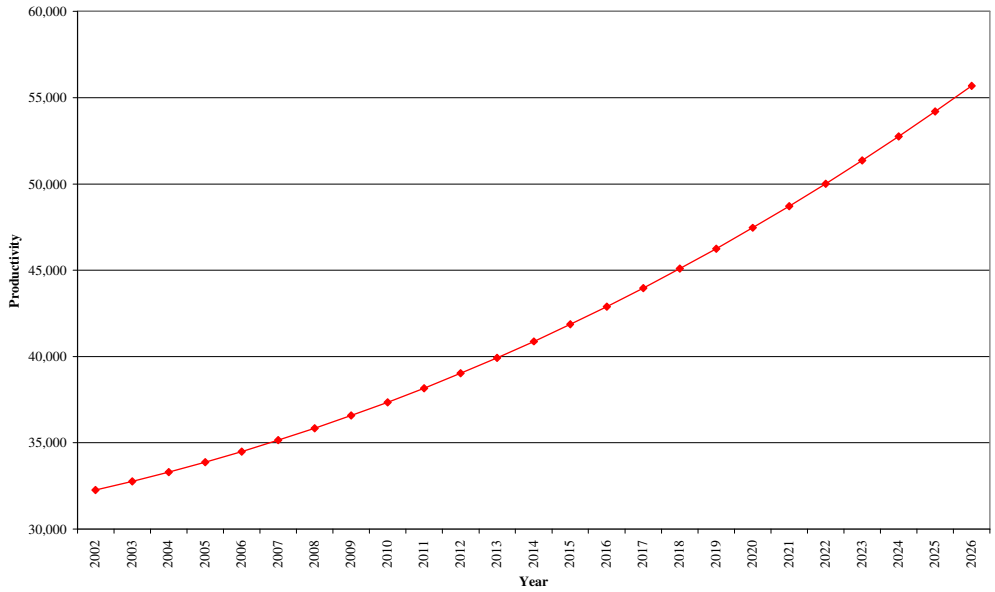
The results for employment and productivity over the twenty-four year period for the PUSH preferred scenario are shown in figures A2.4 and A2.5 below. The model outputs were 'reality checked' with the PUSH steering group and against alternative forecasts for Hampshire and the South East to ensure results were plausible.

Figure A2.4: Employment Change, 2002-2026



Source: DTZ Model

Figure A2.5: Productivity Change, 2002-2026



Source: DTZ Model

Overview of the Industrial, Skills and Occupational Forecast Models

The models for the industrial, occupational and skills breakdown of employment are based on data from the ABI, LFS (Labour Force Survey) and the Cambridge Econometrics (hereafter CE) forecasting model for the South East.

To model likely changes to the industrial structure, analysis of sector change within the CE model, for the South East over the period to 2015, was undertaken. However, there are some significant differences between the South East and the South Hampshire economies. Therefore the model had to be adapted in several ways. 2002 ABI data was analysed to identify how the industrial structure of the South East and South Hampshire differed. In some instances the differences were fairly substantial and the model was amended to take account of this.

For the initial base scenario (2.5% GVA growth) the data analysis from the ABI and the CE South East model as well as DTZ local knowledge were used to formulate the forecast change in the industrial structure over the period to 2026.

For the higher GVA growth scenarios a second set of factors were developed to be applied to the initial model, to cater for a stronger growth in GVA. An element of higher GVA growth is attributable to higher productivity which is partly driven by industrial structure, as well as technological and skills development. Therefore, if GVA growth were to be at a higher level it would be reasonable to expect sectors to grow at slightly different rates. Within the model these factors are fairly small in magnitude and were initially made as a net additional change over the twenty-four year period through looking at how sectors performed in the original model and analysing how an increased growth in GVA would

effect each sector's performance. The additional sector change was applied across the twenty-four year period in a linear fashion. The additional factors that were developed were applied once to the 3% GVA growth scenario and twice to the 3.5% GVA growth scenario to give a better representation of the industrial structure for both of these situations.

For occupational and skills breakdown the models used are simpler, using SIC-SOC and SOC-Skills matrices. It is likely that occupational and skills structures in the local economy will change for two reasons. Firstly, change in the industrial structure of the economy and secondly, changes in the occupational structure within sectors. The first of these two factors is expected to be the most significant. The second element is difficult to model due to a lack of robust data on which to make assumptions. For this reason, we have no basis for analysing how occupational structure within each industry sector would change from the base year. We have therefore based our model on the assumption that there is no occupational change within sectors. Likewise we have no basis on which to model changing skill levels within occupations over time, and so this too remains at the level set in the base year. When considering the results of the model it should be noted that there may be further occupational and skills shifts, which cannot be robustly modelled.