Chapter Four

Data analysis and results

This chapter begins with a restatement of the hypotheses, followed by a presentation of the analytical models. Next are the results of the statistical analysis. The adequacy of the regression model is then examined, including analysis of the residuals, outliers, and tests of multicollinearity. The hypotheses are then tested, and a further model is developed that investigates the existence of a curvilinear relationship for the size variable. The chapter concludes with a summary of the results of the analysis.

4.1 Restatement of hypotheses

The hypotheses developed in Chapter Two are re-presented, firstly in their expected form, and then, for the formal testing procedures, in their associated null form. The first three hypotheses were developed to test the contentions of Jarvenpaa and Ives (1991).

Hypothesis One

H_1: There is a positive linear relationship between EXECPART (executive participation in information technology and information systems [IT]) and PROGIT (the progressive use of IT by Australian hospitals).

H_0: There is no linear relationship between EXECPART and PROGIT.

Hypothesis Two

H_2: There is a positive linear relationship between EXECINVOLV (executive involvement in IT) and PROGIT.

H_0: There is no linear relationship between EXECINVOLV and PROGIT.

Hypothesis Three

H_3: There is a stronger correlation between EXECINVOLV and PROGIT, than between EXECPART and PROGIT.

H_0: There is no difference in the strength of the correlation between EXECINVOLV and PROGIT, and the correlation between EXECPART and PROGIT.

The next three hypotheses test the effect of the selected contextual variables.

Hypothesis Four

H_4: There is a positive linear relationship between HOSTFUND (the type of funding formula used by Australian hospitals) and PROGIT.

H_0: There is no linear relationship between HOSTFUND and PROGIT.

Hypothesis Five

H_5: There is a positive linear relationship between HOSTOWN (the ownership mode [private or public] of Australian hospitals) and PROGIT.

H_0: There is no linear relationship between HOSTOWN and PROGIT.

Hypothesis Six

H_6: There is a positive linear relationship between HOSTSIZE (the size of Australian hospitals) and PROGIT.

H_0: There is no linear relationship between HOSTSIZE and PROGIT.

4.2 Analytical models

Model 4.1 shows the model for simple regression analysis to test Hypothesis One.

$$\text{PROGIT} = \beta_1 X_1 + E_i \qquad \textbf{Model 4.1}$$

Model 4.2 shows the model for simple regression analysis to test Hypothesis Two.

$$\text{PROGIT} = \beta_2 X_2 + E_i \qquad \textbf{Model 4.2}$$

Model 4.3 shows the model for multiple regression analysis using the standardised regression coefficients, describing the model developed to test Hypotheses Four, Five and Six.

$$\text{PROGIT} = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + E_i \qquad \textbf{Model 4.3}$$

Throughout this analysis the following terms are used:

β_i = standardised regression coefficient pertaining to the *i*th variable; the value of which represents the marginal effect of a standard deviation unit of change on the dependent variable when all other variables are held fixed.

X_1 = EXECPART

X_2 = EXECINVOLV

X_3	=	HOSTFUND
X_4	=	HOSTOWN
X_5	=	HOSTSIZE
r	=	Pearson's (1954) product moment correlation coefficient (Pearson's r)
R^2	=	coefficient of determination for the analysis of the sample
Adjusted R^2	=	attempts to adjust the R^2 to more closely reflect the goodness of fit of the model in the population, taking into account the size of the sample and the number of regressors.
E_i	=	sample estimate of the population residual

Hypothesis Three was tested using the significance of the difference between independent rs. Model 4.4 shows the model used to test the relative strength of the regression coefficients (Pearson's r).

$r_{\text{EXECINVOLV}} > r_{\text{EXECPART}}$ **Model 4.4**

β_0 is the regression intercept; serving to adjust for differences in means, giving the predicted value of the dependent variable when the independent variable is zero (Cohen & Cohen 1983, 51). When using the standardised regression coefficient for analysis, the regression line passes through the origin, and the value for β_0 is zero. It therefore does not appear in the regression models.

4.3 Results of statistical analysis

4.3.1 Pearson's *r*

Pearson's *r* is the standard measure of the linear relationship between two variables and has the following properties, as set out by Cohen and Cohen (1993, 36):

1. It is a pure number and independent of the units of measurement.

2. Its absolute value varies between 0, when the variables have no linear relationship, and 1, when each variable is perfectly predicted by the other. The absolute value thus gives the degree of relationship.

3. Its sign indicates the direction of the relationship.

Table 4.1 contains a summary of the correlations identified amongst the variables in the current analysis. In each cell the top line shows Pearson's *r*; the second line shows the number of units of analysis included; and the third line shows the associated level of significance (*p*-value).

Table 4.1 Correlation matrix of hypothesised variables

	PROGIT	EXECINVOLV	EXECPART	HOSTFUND	HOSTOWN	HOSTSIZE
PROGIT	1.00 (132)	.4439 (98) p=.001	.1195 (98) p=.241	.1017 (97) p=.322	.0606 (120) p=.511	.1907 (132) p=.029
EXECINVOLV		1.00 (98)	.4573 (98) p=.001	.2139 (97) p=.035	-.1013 (91) p=.339	.0726 (98) p=.477
EXECPART			1.00 (98)	-.0733 (97) p=.476	-.0476 (91) p=.654	-.0839 (98) p=.411
HOSTFUND				1.00 (97)	-.3269 (91) p=.002	-.1335 (97) p=.192
HOSTOWN					1.00 (120)	-.2764 (120) p=.002
HOSTSIZE						1.00 (132)

4.3.2 Simple regression

Simple regression analysis is a statistical technique used when an independent variable is thought to impact upon a dependent variable. Table 4.2 summarises the results of statistical analyses for the simple regression analyses of both EXECPART and EXECINVOLV on PROGIT.

Table 4.2 Results of simple regression analyses of the effects of EXECPART and EXECINVOLV on PROGIT

	EXECPART **PROGIT** = $\beta_1 X_1 + E_i$	**EXECINVOLV** **PROGIT** = $\beta_2 X_2 + E_i$
R^2	0.014	0.197
Adjusted R^2	0.004	0.189
F	1.392	23.56
Significance of F	0.241	0.001
Minimum pairwise n of cases	98	98
Beta (β)	0.120	0.444
t	1.180	4.854
Significance of t	0.241	0.001

4.3.3 Multiple regression

Multiple regression analysis is a statistical technique used when a number of independent variables are thought to impact upon a dependent variable. The regression coefficients in multiple regression analysis are called partial regression coefficients. This indicates that they are optimal linear estimates of the dependent variables when used in combination with other independent variables (Cohen & Cohen 1983, 82-83). In this analysis the standardised regression coefficient beta *(β)* is used rather than the regression coefficient because the variables were measured on different scales. Cohen and Cohen (1983, 98) describe the standardised regression coefficient as:

> ... the partial regression coefficient when all variables have been standardized. Such standardized coefficients are of interpretative interest when the analysis concerns test scores or indices whose scaling is arbitrary.

Note that using standardised regression coefficient eliminates the constant term since the resultant regression line passes through the origin. Table 4.3 summarises the results of the multiple regression analysis for Australian hospitals.

Table 4.3 Results of multiple regression analysis of the effects of EXECINVOLV; EXECPART; HOSTFUND; HOSTOWN and HOSTSIZE on PROGIT

Variables in the model: $PROGIT = \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + E_i$				
Variable name	**Variable**	**Beta**	***t***	**Significance of *t***
EXECPART	β_1	-.0521	-.475	.6362
EXECINVOLV	β_2	.4513	4.053	.0001
HOSTFUND	β_3	.0947	.878	.3827
HOSTOWN	β_4	.1957	1.843	.0688
HOSTSIZE	β_5	.2203	2.139	.0353
Minimum pairwise *N* of cases	R^2	**Adjusted R^2**	***F***	**Significance of *F***
91	0.2576	0.2140	5.899	0.0001

All statistical analyses were carried out using the SPSS for Windows Release 6.0 (Norusis & SPSS Inc., 1993) statistical package.

4.4 Adequacy of the regression model

Norusis and SPSS Inc. (1993, 324) state:

> You usually don't know in advance whether a model such as linear regression is appropriate. Therefore it is necessary to conduct a search focused on residuals to look for evidence that the necessary assumptions are violated.

The assumptions of regression analysis are summed up by Norusis and SPSS Inc. (1993, 324) in the following way:

In regression analysis, the true errors, e_i, are assumed to be independent normal vales with a mean of 0 and a constant variance of σ^2. If the model is appropriate for the data, the observed residuals, E_i, which are estimates of the true errors, e_i,

should have similar characteristics.

Analysis of the residuals was carried out using the method suggested by Norusis and SPSS Inc. (1993, 324), who define a residual as:

> ... what is left after the model is fit. It is the difference between an observed value and the value predicted by the model:

$$E_i = Y_i - B_0 - B_1X_i = Y_i - Y_i$$

Equation 4.1 describes the residuals for this study.

$$E_i = \text{PROGIT} - (\beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \beta_5x_5) \qquad \textbf{Equation 4.1}$$

Norusis and SPSS Inc. (1993, 324 - 330), discussing the procedure for searching for violations of the assumptions using residuals, identify the following assumptions regarding the residual E_i as follows:

1. Linearity
2. Equality of variance
3. Normality

The results of the analysis of the residuals are now presented. Possible breaches of each of these assumptions is considered in turn. Note that analysis of the residuals is only undertaken for the multiple regression analysis only.

Norusis and SPSS Inc. (1993, 325) make the following statement about the first two assumptions:

> If the assumptions of linearity and homogeneity of variance are met,

there should be no relationship between the predicted and residual values. You should be suspicious of any observable pattern.

Figures 4.1.1 to 4.1.5 show the partial residual plots from the multiple regression analysis for each of the independent variables. Norusis and SPSS Inc. (1993, 351) explain partial regression plots as follows:

> For the *j*th independent variable, ... [the partial residual plot] ... is obtained by calculating the residuals for the dependent variable when it is predicted from all the independent variables excluding the *j*th independent variable and by calculating the residuals for *j*th independent variable when it is predicted from all of the other independent variables.

Figure 4.1.1 Partial residual plot: EXECPART

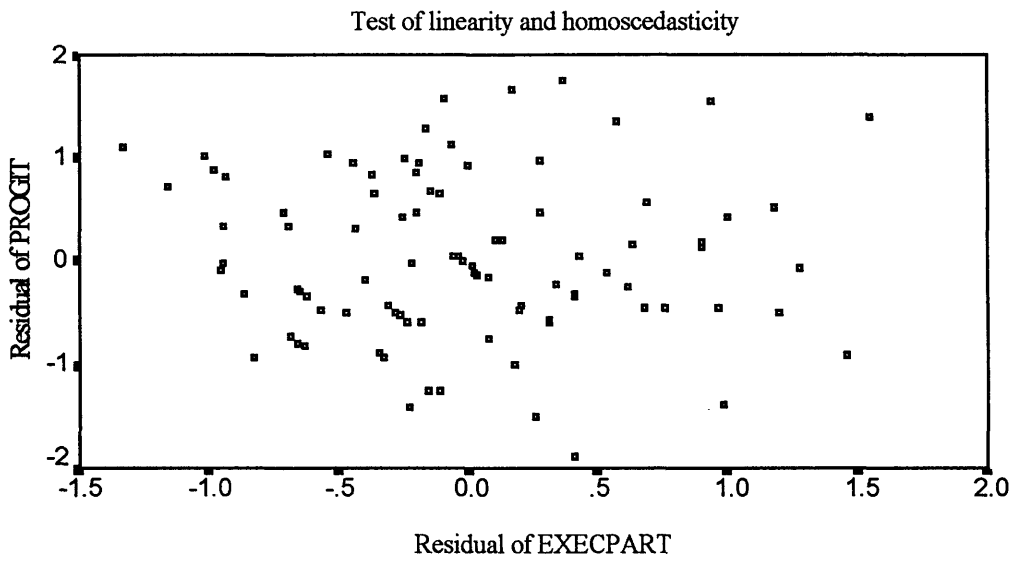


Figure 4.1.2 Partial residual plot: EXECINVOLV

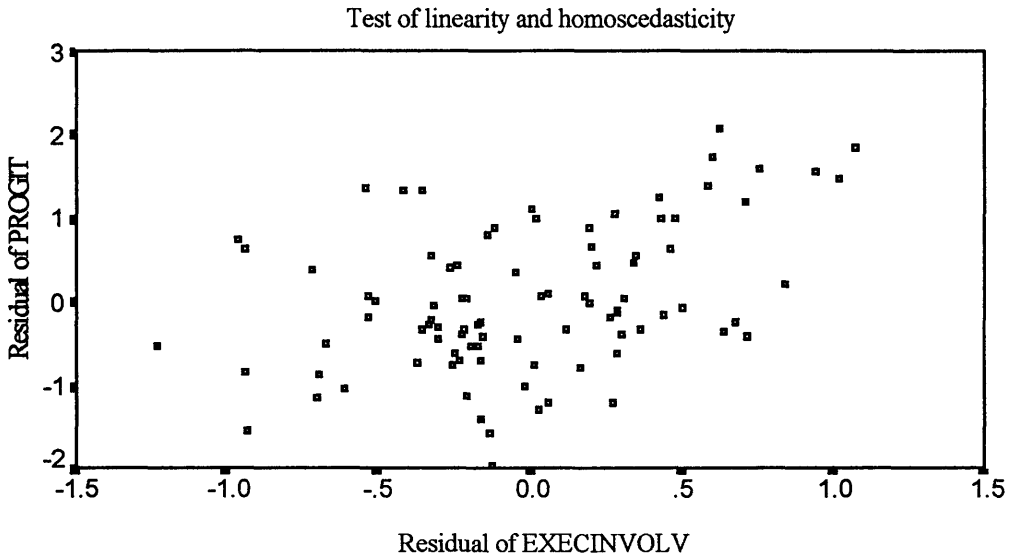


Figure 4.1.3 Partial residual plot: HOSTFUND

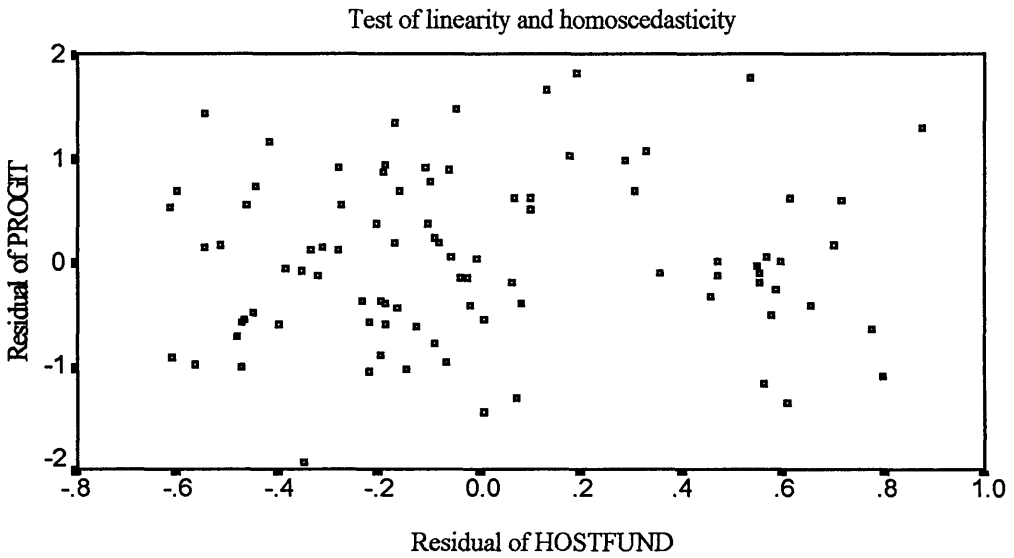


Figure 4.1.4 Partial residual plot: HOSTOWN

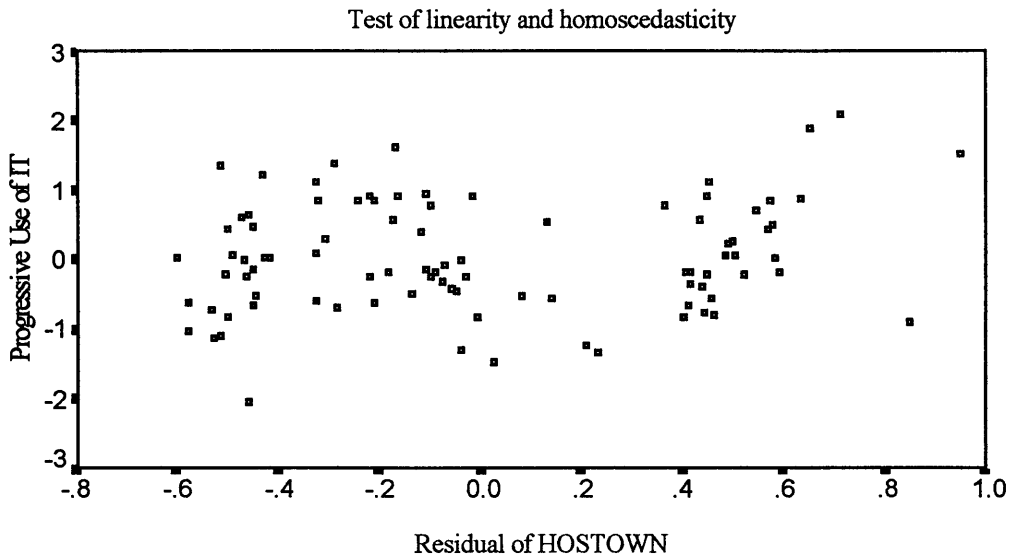
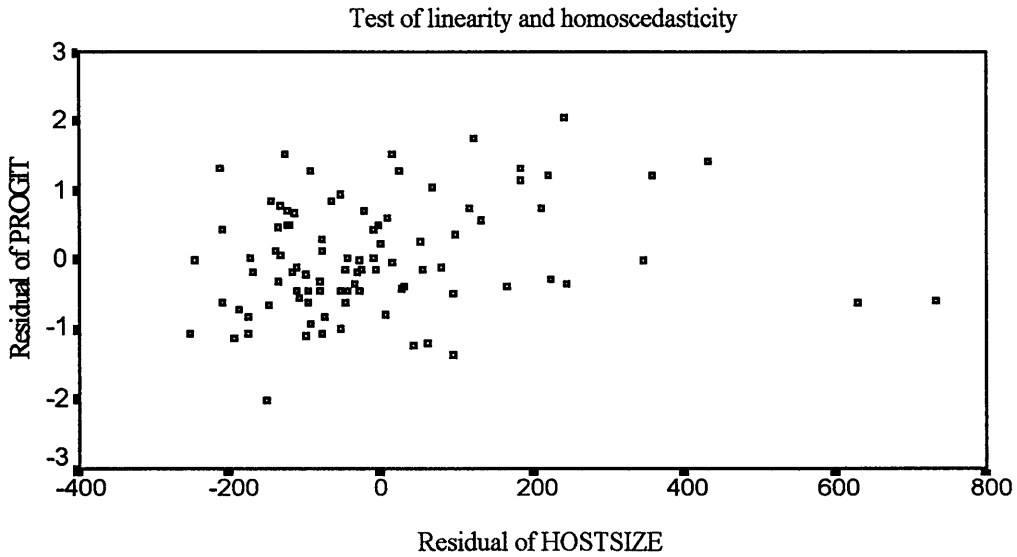


Figure 4.1.5 Partial residual plot: HOSTSIZE



4.4.1 Assumption 1: Linearity

Observation of figures 4.1.1 to 4.1.5 reveals no observable pattern for EXECPART (Figure 4.1.1), HOSTFUND (Figure 4.1.3), or HOSTOWN (Figure 4.1.4). Therefore the assumption of linearity was satisfied for these three variables.

However, the partial residual plots for EXECINVOLV (Figure 4.1.2) and HOSTSIZE (Figure 4.1.5) suggested the possibility of the existence of other (lurking) variables. For the purposes of this dissertation, it was presumed that the EXECINVOLV variable satisfies the linearity assumption.

Observation of the partial residual plot in Figure 4.1.5, however, suggests that the relationship for the HOSTSIZE variable is curvilinear. This partial residual plot suggests the pattern that is upward-sloping at first, but then changes as the variables increase to become downward-sloping. The possibility of the existence of a curvilinear relationship is considered in section 4.7 below.

4.4.2 Assumption 2: Homoscedasticity

Norusis and SPSS Inc. (1993, 327) state that the partial regression plots can be used to check for violations of the homoscedasticity (equality of variance) assumption:

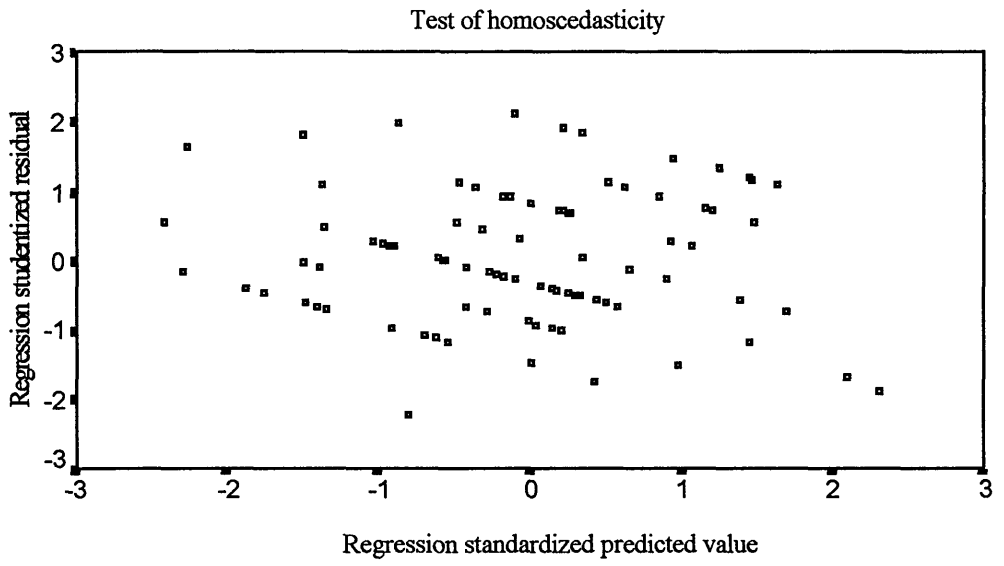
> If the spread of the residuals increases or decreases with values of the independent variables ... you should question the assumption of constant variance of Y for all values of X.

Observation of Figures 4.1.1 to 4.1.5 reveals that none of the relationships exhibits this behaviour, and therefore there has been no violation of this assumption.

An additional test of the equality of variance assumption can be undertaken with reference to the Studentised residual as a function of the predicted values of the model. The Studentised residual is the residual divided by an estimate of its

standard deviation that varies from point to point, depending on the distance of X_i from the mean of X (Norusis & SPSS Inc. 1993, 325). Figure 4.2 shows a plot of the Studentised residuals against the predicted values for the multiple regression model. Observation of this plot reveals that the spread of the residuals remains the same with increases in the predicted values. Thus the equality of variance assumption has not been violated.

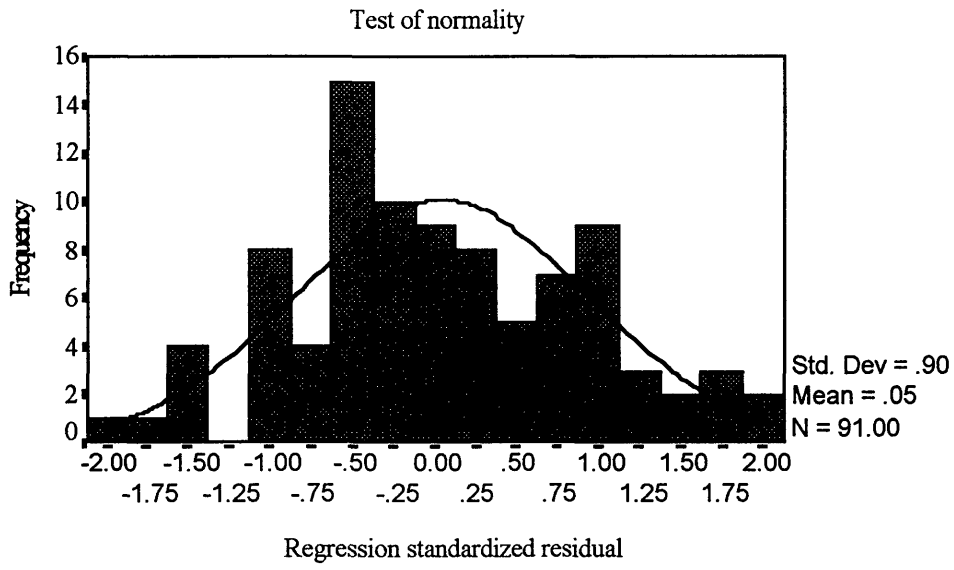
Figure 4.2 Plot of Studentised residuals against predicted variables



4.4.3 Assumption 3: Normality

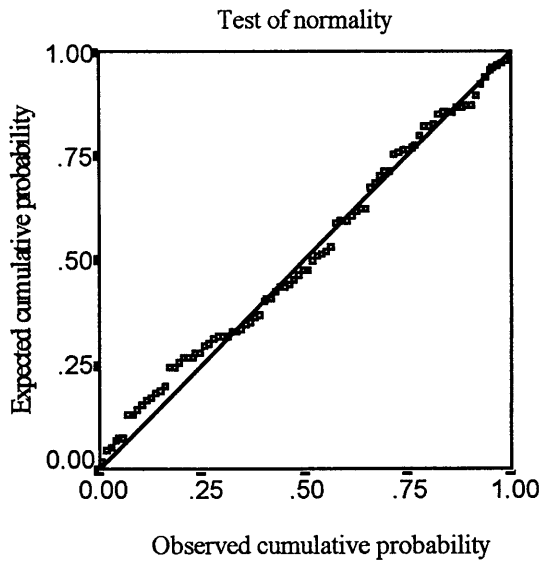
For the values of X_1, X_2, X_3, X_4, and X_5, the distribution of the residual values around the regression model is assumed to be normal. Two tests are used to determine normality. The first is the construction of a histogram of the residuals, upon which a normal distribution is superimposed. In the histogram in Figure 4.3 the distribution, whilst not normal, approaches normality. This assumption is therefore satisfied.

Figure 4.3 Histogram of standardised residuals (5 independent variables)



The other test of normality is to plot the two cumulative distributions against each other for a series of points; if the two distributions are identical, this results in a straight line. By observing how the points scatter about the expected straight line, it is possible to compare the two distributions (Norusis & SPSS Inc. 1993, 329). The results of this analysis are presented in Figure 4.4. Since the observed residuals generally follow the expected "normal" line, the assumption of normality is satisfied.

Figure 4.4 Normal probability plot of standardised residuals



4.4.4 Outliers

Cohen and Cohen (1983, 128) consider the problem of outliers. They describe outliers as:

> ... "far out" observations — ... extreme residuals, either positive or negative.

They go on to state that identifying the existence of outliers is important since (Cohen & Cohen 1983, 128):

> ... an outlier not only makes a relatively large contribution to [the] variance (thus reducing R^2) but also exerts a disproportionately strong pull on the regression.

Cohen and Cohen (1983) do not provide a formal definition of outliers. They say

that definition of an outlier is necessarily arbitrary. However, they offer a test as to whether outliers impact upon an analysis Cohen and Cohen (1983, 128) :

When residuals are standardized by dividing them by their standard deviation, ... a residual that is as much as three of these units in absolute size is reasonably considered an outlier.

The analysis undertaken by SPSS for Windows Release 6.0 (Norusis & SPSS Inc. 1993) indicated that no outliers were found on this criterion, thereby satisfying this test of adequacy.

4.4.5 Multicollinearity

Cohen and Cohen (1983, 115) state:

> The existence of substantial correlation among a set of IV's creates difficulties usually referred to as "the problem of collinearity".

Tables 4.4.1 and 4.1.2 show the collinearity statistics for Model 4.3. Critical data in this model for collinearity testing are the condition indexes and the variance proportions. Each of these is considered in turn.

A condition index is defined as:

$$\text{condition index} = \sqrt{\frac{eigenvalue_{max}}{eigenvalue_i}} \qquad \textbf{Equation 4.2}$$

When referring to eigenvalues and condition indexes, Norusis and SPSS Inc. (1993, 356) state:

There are as many near-dependencies among the variables as there are large condition indexes.

Table 4.4.1 shows the last eigenvalue is much smaller than the rest. Its condition index is 15.058. The second last condition index is also relatively large at 13.8. Nonetheless, Norusis and SPSS Inc. (1993, 356) describe a condition index of 88.22 as being large. In comparison, a condition index of 15.058 is of moderate size.

Table 4.4.1 Collinearity diagnostics: Eigenvalues and condition indexes

Number	Eigenvalue	Condition index
1	4.1982	1.000
2	0.9374	2.116
3	0.6042	2.636
4	0.2197	4.371
5	0.2205	13.800
6	0.0185	15.058

Table 4.4.2 Collinearity diagnostics: Proportions of variance

	Proportions of variance:				
Number	EXECINVOLV	EXECPART	HOSTFUND	HOSTOWN	HOSTSIZE
1	0.0015	0.0019	0.0103	0.0102	0.0126
2	0.0000	0.0000	0.2745	0.2922	0.0021
3	0.0000	0.0001	0.2877	0.1974	0.2600
4	0.0095	0.0313	0.2926	0.4163	0.6056
5	0.1356	0.9340	0.1151	0.0739	0.1200
6	0.8534	0.0327	0.0199	0.0100	0.0002

When referring to the use of variance proportions, Norusis and SPSS Inc. (1993, 357) state:

> The variances of each of the regression coefficients ... can be decomposed into a sum of components associated with each of the

eigenvalues. If a high proportion of the variance of two or more coefficients is associated with the same eigenvalue, there is evidence for near-dependency.

Each of the columns in the right-hand side of Table 4.4.2 reveals the proportion of the variance of each of the coefficients associated with each of the eigenvalues in 4.2.1. The condition indexes for both EXECINVOLV and EXECPART are high, indicating dependence. Since both are measures of executive support, however, this is expected. Development of the EXECPART and EXECINVOLV variables was undertaken in Chapter Three.

4.5 Testing the hypotheses

The level of significance for the analysis testing was set at the 95% confidence level (refer to Chapter Three above).

4.5.1 Testing Hypothesis One (the relationship between EXECPART and PROGIT)

It was hypothesised that the standardised regression coefficient (beta) for the relationship between EXECPART and PROGIT would be statistically significant and positively signed. That is, the more that a CEO participated in IT the more progressive the use of IT in that hospital. Jarvenpaa and Ives (1991, 216) found moderate support for this relationship. In their study they found EXECPART had a beta of 0.49 at the 0.05 confidence level, and explained 16% of the variance (R^2). Inspection of Table 4.2, showing the results of simple regression analysis, shows

EXECPART has a beta of 0.120 at the 0.241 level of significance and explained only 1.4% of the variance (R^2). No statistical significance can be attributed to the relationship, therefore, and the null hypothesis cannot be rejected. This study has identified no significant relationship for the effect of EXECPART on PROGIT in contrast to Jarvenpaa and Ives (1991). This was confirmed in the analysis in Table 4.3 showing the results of the multiple regression analysis where the beta for EXECPART is -0.052 at a level of significance of 0.636.

4.5.2 Testing Hypothesis Two (the relationship between EXECINVOLV and PROGIT)

It was hypothesised that the standardised regression coefficient (beta) for the relationship between EXECINVOLV and PROGIT would be statistically significant and positively signed. The more that a CEO reflected the degree of importance placed on IT the more progressive the use of IT in that hospital. Jarvenpaa and Ives (1991, 216) found strong support for this relationship. In their study they found that executive involvement had a beta of 0.46 at the 0.01 level of significance, and explained 32% of the variance (R^2).

Inspection of Table 4.2 shows EXECINVOLV has a beta of 0.444 at the 0.001 level of significance. This explained 19.7% of the variance. The relationship between EXECINVOLV and PROGIT therefore suggests the existence of a statistically significant, positively sloped linear relationship, and the null hypothesis can be rejected. This was confirmed in the analysis in Table 4.3 showing the results of the multiple regression analysis showing that the beta for

EXECINVOLV is 0.4513 at a level of significance of 0.0001. It supports the findings of Jarvenpaa and Ives (1991) that EXECINVOLV influences the progressive use of IT within an organisation.

4.5.3 Testing Hypothesis Three (the relative strength of correlation coefficients of Models One and Two)

It was hypothesised that the Pearson's (1951) product moment correlation coefficient (Pearson's *r*) for the relationship between EXECINVOLV and PROGIT would be significantly greater than for the relationship between EXECPART and PROGIT. In order to reject the null hypothesis that there is no difference between Pearson's *r* for EXECPART and EXECINVOLV it is necessary to calculate a *t*-value at (*n* - 2) degrees of freedom for Pearson's *r* in each relationship. The *t*-value is calculated from the following equation (Cohen & Cohen 1983, 52):

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}} \qquad \textbf{Equation 4.3}$$

Reference to Table 4.1, the correlation matrix of hypothesised variables, shows Pearson's *r* to be 0.120 for the relationship of EXECPART on PROGIT. With a sample size (*n*) of 98, this gives a value for *t* (from Equation 4.3) of 1.179. This is less than the critical value of 1.984 obtained from the table of *t*-values with 96 degrees of freedom at the 95% confidence level (Cohen & Cohen 1983, Table A, 519). Therefore no statistical significance can be attributed to Pearson's *r* for EXECPART on PROGIT.

Table 4.1 shows that Pearson's r for EXECINVOLV on PROGIT is 0.444 and n is 98, giving a t-value of (from Equation 4.3) of 4.854. The critical value from the table of t-values with 96 degrees of freedom at the 95% confidence level is 1.984 (Cohen & Cohen 1983, Table A, 519). The value of t for the sample of Australian hospitals is greater than the critical value (from the table of t-values) of 1.984, and therefore Pearson's r for this relationship is statistically significant.

There is statistical significance for the relationship of EXECINVOLV on PROGIT, but none identified for EXECPART on PROGIT. Therefore it is possible to reject the null hypothesis that $r_{\text{EXECINVOLV}} = r_{\text{EXECPART}}$ in favour of the alternative hypothesis that $r_{\text{EXECINVOLV}} > r_{\text{EXECPART}}$. This supports the results of Jarvenpaa and Ives (1991, 216) who concluded that "executive involvement" is more strongly correlated with the progressive use of IT than EXECPART.

4.5.4 Testing Hypothesis Four (the relationship between HOSTFUND and PROGIT)

It was hypothesised that the beta for the relationship between HOSTFUND and PROGIT would be statistically significant and positively signed. Hospitals deriving funds from a casemix formula would be more likely to be progressive in their use of IT than hospitals that derived their funds from a more traditional basis (determined by funding levels of previous years).

Inspection of Table 4.3 shows that HOSTFUND has a beta of 0.0947 at the 0.3827 level of significance. No statistical significance can be attributed to the relationship, therefore, and the null hypothesis cannot be rejected. Therefore this

study has identified no significant relationship for the effect of HOSTFUND on PROGIT.

4.5.5 Testing Hypothesis Five (the relationship between HOSTOWN and PROGIT)

It was hypothesised that the beta for the relationship between private (or public) ownership and PROGIT would be statistically significant and positively signed. Privately owned hospitals would be more likely to be progressive in their use of IT than public hospitals.

Inspection of Table 4.3 shows private (public) ownership has a beta of 0.1957 at the 0.0688 level of significance. The level of significance for this study was set at the 95% confidence level. Therefore the relationship between private (or public) ownership and PROGIT is not statistically significant and the null hypothesis cannot be rejected. However, because a significance level of 0.0688 is only just outside the predetermined parameters, this suggests the possible existence of a positively sloped linear relationship.

4.5.6 Testing Hypothesis Six (the relationship between HOSTSIZE and PROGIT)

It was hypothesised that the standardised regression coefficient (beta) for the relationship between HOSTSIZE and PROGIT would be statistically significant and positively signed. That is, the larger the hospital the more progressive the use of IT in that hospital.

Inspection of Table 4.3 shows HOSTSIZE has a beta of 0.2203 at the 0.0353 level

of significance. The relationship between HOSTSIZE and PROGIT therefore suggests the existence of a statistically significant, positively sloped linear relationship, and the null hypothesis can be rejected. Care must be taken with the results of this analysis, however, since inspection of Table 3.6 (the histogram of HOSTSIZE) shows that the distribution of the size variable is positively skewed, and does not meet the criterion of normality.

Analysis of the residuals revealed the possibility that the HOSTSIZE variable could be curvilinear. This possibility is considered in the next section.

4.6 Considering the existence of a curvilinear relationship in the model

Analysis of the residuals suggested the existence of a curvilinear relationship for the HOSTSIZE variable. Model 4.5 shows the regression analysis of all the hypothesised variables. An additional variable, HOSTSIZE squared, is included to test for the possibility of the existence of a curvilinear relationship.

$$\text{PROGIT} = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 - \beta_5 X^2_5 + E_i \qquad \textbf{Model 4.5}$$

Table 4.5 The effect of EXECPART; EXECINVOLV; HOSTFUND; HOSTOWN; HOSTSIZE; and SIZESQ, on PROGIT

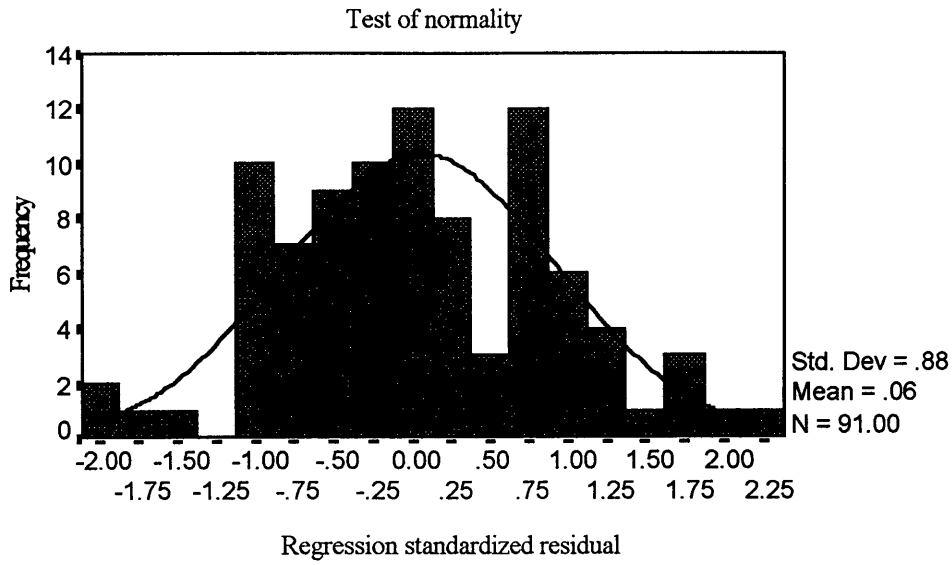
Variables in the model: PROGIT = $\beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 - \beta_5 X^2_5 + E_i$				
Variable name	**Variable**	**Beta**	***t***	**Significance of *t***
EXECPART	β_1	-0.0324	-0.302	0.7634
EXECINVOLV	β_2	0.4629	4.259	0.0001
HOSTFUND	β_3	0.0941	0.894	0.3740
HOSTOWN	β_4	0.2123	2.046	0.0439
HOSTSIZE	β_5	0.8717	2.931	0.0044
SIZESQ	β^2_5	-0.6807	-2.327	0.0224
Minimum pairwise *N* of cases	R^2	**Adjusted R^2**	***F***	**Significance of *F***
91	0.3026	0.2528	6.074	0.0001

Table 4.5 shows the results of the multiple regression analysis for the variables in Model 4.5. Observation of Table 4.5 shows the beta for SIZESQ is -0.681 at the 0.022 level of significance. This indicates that the form of the relationship between hospital size and PROGIT is significant, and that its shape is convex curvilinear. It suggests that, as the size of an Australian hospital increases, there is an increase in PROGIT at first. As the size increases, however, the rate of increase in PROGIT diminishes until it reaches a certain point, and then it begins to decrease.

The data in Table 4.5 can now be compared with the results of the multiple regression analysis in Table 4.3. The proportion of variance (R^2) increased from 0.2576 for Model 4.3 to 0.3026 for Model 4.5 when the hospital size squared variable (SIZESQ) was added to the equation. There was considerable improvement. There seems strong evidence for the existence of a curvilinear relationship of HOSTSIZE with PROGIT.

Further evidence of the existence of a curvilinear relationship is obtained by examining the histogram of standardised residuals for Model 4.5, presented in Figure 4.5. This histogram shows a pattern that more closely resembles a normal distribution than that of Figure 4.3, the histogram of standardised residuals for Model 4.3.

Figure 4.5 Histogram of standardised residuals (6 independent variables)



Inclusion of SIZESQ influenced the statistical significance of the other variables as well. Most notable of these changes is that the statistical significance for the HOSTOWN variable improved to 0.0439, thereby meeting the predetermined 95% confidence level.

As with the HOSTSIZE variable, care must be taken with the interpretation of the results because of the fact that it does not meet the normal distribution criterion for parametric testing.

4.7 Summary

The hypothesised relationships were developed in Chapter Two. Models 4.1 and 4.2 represent the hypothesised linear relationships between PROGIT and EXECPART and EXECINVOLV. Each is presented as a simple regression model.

Hypothesis One, testing the effect of EXECPART on PROGIT, was not supported by the results of the simple regression analysis. EXECPART had a beta of 0.120 at a significance of 0.241. It explained 1.4% (R^2) of the variance in the model. No statistical significance can be attributed to this relationship.

Hypothesis Two, testing the effect of EXECINVOLV on PROGIT, was supported by the results of the simple regression analysis. EXECINVOLV had a beta of 0.444 at the 0.001 level of significance. It explained 19.7% (R^2) of the variance in the model. The relationship between EXECINVOLV and PROGIT is therefore a statistically significant linear relationship with a positive slope.

Hypothesis 3, testing the relative strength of correlation between EXECPART and PROGIT and EXECINVOLV and PROGIT, was supported from the comparison of statistical significance analysis of Pearson's *r*s. The relationship between EXECPART and PROGIT was not found to be statistically significant, whilst statistical significance was found for the relationship between EXECINVOLV and PROGIT. Of the two constructs of executive support, EXECINVOLV demonstrates the stronger correlation with PROGIT.

Model 4.3 represents the hypothesised linear relationship between PROGIT and the above two variables as well as three other contextual variables: HOSTFUND, HOSTOWN, and size. This was presented as a multiple regression model that provided a basis for testing Hypotheses Four to Six. It provided an estimation of the form and significance of the relationship between PROGIT and each of the independent variables when the other variables were held constant. The first

multiple regression analysis (results summarised in Table 4.3) produced an F-statistic of 5.899 at a significance of 0.001, an R^2 of 0.2576, and an adjusted R^2 of 0.2140. The second multiple regression analysis (results summarised in Table 4.5) contained an additional variable, size squared, and increased the F-statistic to 6.074 at the same level of significance. R^2 increased to 0.3026, and adjusted R^2 increased to 0.2528.

Hypothesis Four, testing the effect of HOSTFUND on PROGIT, was not supported by the results of the multiple regression analysis. HOSTFUND was shown in the second multiple regression analysis to have a beta of 0.0947 at the 0.3827 level of significance. No statistical significance can be attributed to this relationship.

Hypothesis Five, testing the effect of HOSTOWN on PROGIT, was not supported by the results of the multiple regression analysis. Private (or public) ownership was shown in the second multiple regression analysis to have a beta of 0.1957 at the 0.0688 level of significance. The relationship between private (or public) ownership and PROGIT, whilst not meeting the pre-determined significance criterion, lay only just outside this parameter. Inclusion of the size squared variable influenced the statistical significance of the HOSTOWN variable to 0.0439, however, and brought it within the predetermined 95% confidence level. This confirmed the existence of a statistically significant linear relationship with a positive slope for the HOSTOWN variable.

Hypothesis Six, testing the effect of hospital size on PROGIT, was supported by

the results of the multiple regression analysis. Hospital size was shown in Model 4.5 (the second multiple regression analysis) to have a beta of 0.2123 at the 0.0353 level of significance. The relationship between hospital size and PROGIT is therefore statistically significant. Hospital size squared was shown in the Model 4.5 to have a beta of -0.6807 at the 0.0224 level of significance. This revealed that the shape of the relationship between hospital size and PROGIT was convex curvilinear, increasing at first, and then decreasing. Care must be taken when testing the size variables since the responses that measure them do not meet the test of normality, being positively skewed.

Chapter Five

Discussion and conclusions

This chapter begins with an overview of the dissertation and the results of the statistical analyses. This is followed by a discussion of the results as they relate to Jarvenpaa and Ives (1991) and the three contextual factors. Next the limitations of the dissertation are considered, and this is followed by a consideration of the implications of the dissertation for theory and practice. The chapter concludes with a consideration of possible future areas for research.

5.1 Overview and results

This dissertation aimed at clarifying the concept of executive support for the progressive use of information technology and information systems (IT) within an organisation. It replicated and extended the work of Jarvenpaa and Ives (1991). Jarvenpaa and Ives (1991) surveyed firms from four industries listed in *Fortune 500* and found that executive involvement was a better predictor of the progressive use of IT than executive participation. Executive participation was defined as a set of IT-related management activities of the CEO. Executive involvement was defined as a psychological state reflecting the degree of importance placed on IT by the CEO. The distinction between these two constructs was made by Barki and Hartwick (1989).

Details of the research of Jarvenpaa and Ives (1991) and Barki and Hartwick (1989) were presented in Chapter Two. This dissertation examined the extent to which the models developed by Jarvenpaa and Ives (1991) applied within Australian hospitals. Australian hospitals are organisations whose value chains are high in information intensity (Porter & Millar, 1985), and therefore suitable for this type of analysis. Chapter Two concluded with a presentation of the hypotheses developed for formal testing of the models.

Chapter Three contains a discussion of the methods used to collect, collate, and analyse the data on which the results were based. These were similar to the methods used by Jarvenpaa and Ives (1991). Cronbach alpha and factor analysis were used to identify which items should be included in the multi-item scales for executive participation and executive involvement. These analyses revealed that the same four items as those used by Jarvenpaa and Ives (1991) would be used to measure executive involvement, but that only four of the six items would be used to measure executive participation.

Chapter Four contains the results of the analyses undertaken in this dissertation. The analyses were again similar to those used by Jarvenpaa and Ives (1991). A comparison of the results of the simple regression analyses of both studies is presented in Table 5.1.

Table 5.1 Comparative results of simple regression analyses: Australian hospitals and Jarvenpaa & Ives (1991)

		Executive Participation	Executive Involvement
Beta	Australian hospitals	0.120	0.444
	Jarvenpaa and Ives (1991)	0.49	0.46
***F*-statistic**	Australian hospitals	1.392	23.56
	Jarvenpaa and Ives (1991)	10.54	22.02
Significance of *F*	Australian hospitals	0.241	0.001
	Jarvenpaa and Ives (1991)	0.05	0.01
R^2	Australian hospitals	0.014	0.197
	Jarvenpaa and Ives (1991)	0.16	0.32

The results in Table 5.1 show that executive involvement demonstrates statistically significant correlation with progressive use of IT in both research environments. The statistics for executive participation, whilst revealing moderate strength of correlation in Jarvenpaa and Ives (1991), indicate that no statistical significance can be attributed to the relationship for Australian hospitals.

In both research environments, however, executive involvement was found to have a stronger correlation with progressive use of IT than executive participation. This finding supports the first two hypotheses developed by Jarvenpaa and Ives (1991). It also supports the recommendations of Barki and Hartwick (1989).

The research in this dissertation extended the work of Jarvenpaa and Ives (1991) by testing the effects of three contextual factors on the progressive use of IT. These factors were the type of funding formula (casemix or other), the ownership mode (whether the hospital was privately or publicly owned), and hospital size. Of these, statistical significance was found for the ownership mode and size factors. No statistical significance was found for the relationship between funding formula

and the progressive use of IT. Further investigation of the size factor suggested the possibility that the shape of this relationship is convex curvilinear. Care must be taken in regard to the interpretation of the results involving the size factor, since the distribution of the responses indicate that they are not normally distributed. The histogram of these responses, contained in Figure 3.6 indicate that the distribution is positively skewed.

5.2 Discussion

5.2.1 Jarvenpaa and Ives (1991)

Results in this research dissertation show that a CEO's psychological state concerning the importance of IT for the success of the organisation (executive involvement) is a better predictor of the progressive use of IT within the organisation than IT-related management activities (executive participation). This supports the findings of Jarvenpaa and Ives (1991). Expressed in practical terms, it is better for CEOs to communicate their view of the importance of IT for an organisation's success than to engage in IT-related management activities.

Consideration is now given to the relative weak correlation in the results for the study of Australian hospitals. There are two possible explanations for this phenomenon. Firstly, it is possible that the IT-related administration activities of CEOs have no effect on the progressive use of IT within an organisation. This an unlikely alternative since the strength of correlation identified for executive participation by Jarvenpaa and Ives (1991) was so strong. A better explanation is

that CEOs in Australian hospitals behave differently to firms in more competitive industries like those surveyed by Jarvenpaa and Ives (1991).

This argument could be extended to account for the relative weakness in the correlation between executive involvement and progressive use of IT. CEOs in Australian hospitals may not have the same level of IT exposure or training. Summary statistics contained in Table 3.8 shows that 54% of CEOs have acted at that level for more than five years. Perhaps the longer-serving CEOs who make up more than half the sample do not feel comfortable with IT and hesitate in its support.

Another possible explanation of the relative weakness of the results is that CEOs of organisations in the public sector do not behave in the same way with respect to the progressive use of IT as those in the private sector. The influence of the public sector can be seen from observation of Figure 3.5, the histogram of HOSTOWN. It shows that approximately twice the number of public hospitals were included in the sample compared with the number of private hospitals. Arguments were presented in Chapter Two showing that with the introduction of casemix funding Australian hospitals would become more competitive. However, the change in funding formula is still in its early stages and Australian hospitals have not been exposed to competition to the same degree as *Fortune 500* organisations.

Additional evidence of the effect of the public sector on the results of this research is obtained by examining the effect of the ownership mode on the progressive use of IT. This is considered below in Section 5.2.3.

5.2.2 Casemix funding

Throughout Australia there is a move to change the funding formula for hospitals from the traditional historical basis to one based on the hospital's casemix. The casemix score is determined by the profile of the hospital's diagnosis-related groups (DRGs). Each DRG groups together patients who use similar resources for their treatments, and thus attracts a specific amount of funding based on a national standard. A hospital's funding for any period is based on its DRG profile or casemix.

It was anticipated that casemix funding would significantly impact upon the progressive use of IT in Australian hospitals, and that there would be a linear relationship with a positive slope. That is, hospitals that derive their funding from a casemix formula would demonstrate greater progressive use of IT than hospitals whose funds are allocated on a different formula. A casemix funding system is necessarily complex because it is linked to patient throughput, measured by numbers of patients discharged, as well as total incidents of care (Douglas & Hirth 1991, 8). Data must be recorded in a timely and efficient manner if hospitals are to receive the funds to which they are entitled. Systems hardware and software need to be acquired; skilled personnel need to be hired and trained.

The research results indicated that there is no statistical significance for the model proposed. A possible explanation for this result is that it is too early for the effects of casemix funding to be felt on the progressive use of IT. DRGs have been developed to date only for acute care in public hospitals, and the system is still

being refined for private hospitals. There are also differences in the extent to which public hospitals have adopted a casemix formula between Australian states. For example, the Resource Allocation Formula (RAF) system in operation in NSW provides hospitals with a base payment determined by their population profile, and a further payment is made on a casemix system. South Australia, Western Australia, and Queensland have only recently introduced the casemix system. Victoria is the only Australian state that has introduced the system in its entirety, but then only for acute care.

It is too early in the implementation process for the effect of casemix funding on the progressive use of IT in Australian hospitals to be detected. However, similar research carried out at a later date could identify a relationship of the type hypothesised in this dissertation.

5.2.3 Ownership mode

It was hypothesised that private hospitals would be more progressive in their use of IT than public hospitals. Private hospitals, being more strongly influenced by the need to recover costs, would be more likely to be involved in the progressive use of IT. The reason for this is that they are driven by desire to make their operations more efficient and more effective. They would also be more likely to have the characteristics of the firms used in the Jarvenpaa and Ives (1991) sample. Inclusion of this factor permitted an examination of the extent to which private hospitals differ in their progressive use of IT compared with public hospitals. The

statistical analysis showed that private hospitals were more progressive in their use of IT than public hospitals. This supports the explanation that the high proportion of public hospitals in the sample influenced the relative weakness of the correlations. Additional evidence is that there were twice as many public hospitals in the sample than private hospitals.

5.2.4 Hospital size

It was hypothesised that larger hospitals would be more progressive in their use of IT than smaller hospitals. As size increases, so does the level of sophistication of systems necessary for efficient and effective operations. The administrative systems in small hospitals need only be operated manually. They would not necessarily require payroll, patient records or communications systems to be computerised. Larger hospitals would be more likely to justify the use of computerised systems in terms of cost/benefit analyses, and would benefit from the production of information in a timely manner for purposes of external reporting, internal decision-making, and communicating. Progressive use of IT would produce economies of scale whereby complex IT would be justified on the basis of the increased complexity of systems that arise from the size of the organisation.

The initial statistical analysis showed that larger hospitals are more progressive in their use of IT than smaller hospitals. This supports the hypothesised relationship between these two factors. However, further analysis showed that the shape of the relationship between hospital size and progressive use of IT was convex

curvilinear. That is, as size increases Australian hospitals are more progressive in IT, but that the rate of increase decreases to a point where the progressive use of IT begins to decline. This phenomenon could be explained by the fact that there is a size at which there is a perception that an Australian hospital no longer requires progressive use of IT. Perhaps for large hospitals the focus is on maintaining existing systems and ensuring that they operate as they should, and that there is no culture within the hospital for finding new ways of doing things.

Nonetheless, the possibility of the existence of a convex curvilinear relationship between size and the progressive use of IT for Australian hospitals was not hypothesised at the outset. Further analysis of this result is considered to be beyond the scope of this dissertation.

5.3 Limitations

5.3.1 Jarvenpaa and Ives (1991)

Some reservations are held regarding the uncritical adoption of the terminology used by Jarvenpaa and Ives (1991) in the measurement of the "support" concept. There is a belief that the concept is too broad and too contingent, and that what really is being implied are the subtle communicative processes of the CEO, as well as the organisational culture within which this takes place. What is important here is not so much the support provided by the CEO in the progressive use of IT, but the way it is used, and the extent to which the CEO communicates this support.

Whilst this research considers the impact of executive support on the progressive use of IT, regard must be given to the possibility that the correlations operate in reverse. That is, availability of IT could give rise to an enhancement of the support provided by the CEO. Progressive use of IT may have an effect upon the CEO of an organisation. As new IT is developed and CEOs are convinced of the efficacy of these developments CEOs will be convinced of their advantages and their importance for the success of the organisation.

Although this reverse in direction is mooted as a possibility, the view of this writer is that CEOs generate their support, not from the availability of IT but from an understanding of its importance to the organisation. The question is how progressive use of IT can best be supported, rather than what developments are taking place in IT that might increase CEO support.

5.3.2 The size factor

Care must be taken with the results of the analysis of the effect of size on the progressive use of IT. Data collected from the sample shows that distribution of the size and size squared factors are clustered towards the low end of the factor, and can be said to be positively skewed (de Vaus 1991, 140). Great care must therefore be taken interpreting the results of the statistical analysis. Nonetheless, the results of the multiple regression analyses show that the relationships hypothesised are statistically significant, and further investigation of the phenomenon could be rewarding.

5.4 Implications

5.4.1 Theoretical implications

The analysis carried out in this dissertation supports the findings of Jarvenpaa and Ives (1991, 216) that:

> ... the CEO's psychological state about IT ... [appears to be] ...a more powerful predictor of the firm's progressive use of IT than a CEO's personal participation in IT management.

The relative strength of the two sub-sets of executive support held true in a different research environment. Although the correlations for executive participation and executive involvement were found to be weaker than those identified by Jarvenpaa and Ives (1991), this could be accounted for by the inclusion of organisations from the public sector. Casemix funding has increased the amount of competition within public hospitals, and it is felt that because of this the strength of correlations predicted by the models developed by Jarvenpaa and Ives (1991) will increase.

5.4.2 Management implications

CEOs of organisations such as those examined in Jarvenpaa and Ives (1991) and in this dissertation need to identify the best way of promoting the progressive use of IT. Such persons have ultimate responsibility for the performance of their organisation, and if they are to operate efficiently and effectively they need to take

advantage of the benefits offered by IT. Their time is scarce and hence valuable. They need to identify the most appropriate and effective way of supporting the progressive use of IT within their organisations.

The research in this dissertation supported the findings of Jarvenpaa and Ives (1991) that it is more appropriate for CEOs to communicate their belief in the importance of IT for the success of the organisation than to actively participate in IT-related management activities. This finding could come as a pleasant surprise to CEOs who do not feel comfortable with the developing technology, even though they do understand its importance. The message to these CEOs is that they do not necessarily need to engage in IT-related activities. Instead, they can communicate their perception of the value of IT. The research findings in this dissertation suggest that the most crucial aspect of this communication is the psychological support that CEOs are able to provide to the organisation. That is, it will be enough for CEOs to communicate their commitment and support for such projects, rather than becoming personally active in an area in which they have little expertise.

5.5 Future research

Although the results set out in this dissertation support some of the findings of previous research, more empirical work is needed to clarify the concepts developed to date. Although this dissertation has gone some way to testing the recommendations made by Barki and Hartwick (1989, 59-60), and testing the

"generalizability" of the findings of Jarvenpaa and Ives (1991, 219), it is necessary to continue to explore the concepts of participation and involvement. Jarvenpaa and Ives (1991) suggest that:

> Future measures of [the progressive use of IT] should focus at the firm level ....

The research outlined in this dissertation examined the progressive use of IT within Australian hospitals. Research focusing on the support provided by the CEO of a single hospital could provide good data for analysis. Measures of the form and value of the support provided by the CEO as identified by other members of the hospital organisation would be valuable. This could provide interesting results, bearing in mind the finding relating to "demand syndrome" demonstrated by CEOs both in this dissertation and that of Jarvenpaa and Ives (1991).

Further research could be carried out to identify the possible existence of a curvilinear relationship between the size factor and the progressive use of IT within an organisation. Jarvenpaa and Ives (1991, 220) refer to the value of examining the size factor, referring to the findings of DeLone (1988) who found a strong relationship between the CEO's personal participation and the firm's successful use of IT in small businesses with fewer than 300 employees.

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Appendix A

Cover letters sent to personnel in Australian hospitals

CHARLES STURT UNIVERSITY LETTERHEAD

«TITLE»,
«HOSP_NAME»,
«ADDRESS»,
«CITY» «POSTCODE»
«STATE»

8 May, 1995

Dear Sir or Madam,

Survey of top executives regarding IT (information technology and information systems) in Australian hospitals.

We are investigating the role played by top management in the use of IT within Australian hospitals. Please assist us with our survey. Your hospital was selected using a random sampling process from the publication *Hospital and Health Services Year Book, 1993-94*, 18th Edition, Peter Isaacson Publications, Prahran, Victoria.

By investigating the factors that influence the use of IT within Australian hospitals we will be able to understand how this technology can be effectively implemented. Two survey forms are enclosed. One is to be filled out by you, the Chief Executive Officer (CEO), and the other (similar) survey form is to be completed by your most senior IT manager. Could you please:

1. Complete the CEO survey form and return it to us by post in the enclosed stamped addressed envelope, and
2. Forward the envelope containing the senior IT manager survey form to the relevant person.

Thank you for your assistance in this matter. We urge you to complete and return your survey form as soon as possible. It should take no more than 10 minutes of your time. If you would like to obtain a summary of the findings, please indicate by writing your address on the back of the stamped addressed envelope.

We stress that your responses will remain strictly confidential, and we do not necessarily require your name, or the name of your hospital, to appear on the survey form. The code on the survey form is for statistical matching purposes only, and we will base our report on a summary of the aggregate data. We appreciate your assistance in this project.

Yours sincerely,

Graeme C. Rose
Project Leader

Phone: [060] 41 8903 (Work)
or [057] 21 8339 (Home)
Fax: [060] 41 8878
EMAIL: grose@csu.edu.au

CHARLES STURT UNIVERSITY LETTERHEAD

The Senior IT Manager,
«HOSP_NAME»,
«ADDRESS»,
«CITY» «POSTCODE»
«STATE»

8 May, 1995

Dear Sir or Madam,

Survey of top executives regarding IT (information technology and information systems) in Australian hospitals.

We are investigating the role played by top management in the use of IT in Australian hospitals. Please assist us with our survey. Your hospital was selected using a random sampling process from the publication *Hospital and Health Services Year Book, 1993-94*, 18th Edition, Peter Isaacson Publications, Prahran, Victoria.

By examining the factors that influence the use of IT within Australian hospitals we will be able to understand how this technology can be effectively implemented. Could you please complete the survey form and return it to us by post in the attached stamped addressed envelope.

Thank you for your assistance in this matter. We urge you to complete and return your survey form as soon as possible. It should take no more than 10 minutes of your time. If you would like to obtain a summary of the findings, please indicate by writing your address on the back of the stamped addressed envelope.

We stress that your responses will remain strictly confidential, and we do not necessarily require your name or the name of your hospital to appear on the survey form. The code on the survey form is for statistical matching purposes only, and we will base our report on a summary of the aggregate data. We appreciate your assistance in this project.

Yours sincerely,

Graeme C. Rose
Project Leader

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or [057] 21 8339 (Home)
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Appendix B

Survey forms sent to personnel in Australian hospitals

CHARLES STURT
U N I V E R S I T Y

CEO SURVEY FORM

Thank you for agreeing to provide information for our research project. This survey form is to be completed by the chief executive officer (CEO). It has been designed to collect information about your hospital and about the role you play in the use of information technology and information systems (IT) within your hospital.

The survey form is designed to be completed in around ten (10) minutes, to ensure that not too much of your time is taken. Nevertheless, the information you provide is important in assessing the role you play with respect to IT within your hospital, and we ask that you give it careful consideration.

On completion could you please return this survey form by post using the enclosed stamped addressed envelope, and forward the senior IT manager survey form on to the relevant person.

Section I: asks about your hospital.

Section II: asks about the status of your senior IT manager.

Section III: asks about your approach to IT within your hospital.

For each of the following questions you are asked to circle the number representing the ***most appropriate*** response.

SECTION I **Hospital Profile**

1. What is the size of your hospital?
(approximate number of maintained beds)

Optional Comment: _____

_____

2. The amount of funds received by my hospital is predominantly determined by case mix.

Strongly agree **[1]** **[2]** **[3]** **[4]** **[5]** **Strongly disagree**

Optional Comment: _____

_____

3. State the estimated proportion of funds received via the casemix formula.

%

4. How would you describe your hospital's use of IT (information technology and information systems)?

5	4	3	2	1
a leading hospital	close follower	middle of the pack	somewhat behind	laggard

Optional Comment: _____

_____

5. Is your hospital a private hospital or a public hospital?

SECTION II **The organisational status of your senior IT manager**

1. What is the title of the person to whom your senior IT manager reports?

_____

2. How many ***levels*** in the organisation hierarchy is your senior IT manager below you (the CEO)?

1	2	3	4	5	6

SECTION III Chief executive officer (CEO) characteristics

1. For how many ***years*** have you served as a CEO?

1	2	3	4	5	More than 5

2. For how many ***years*** have you served as CEO of this hospital?

1	2	3	4	5	More than 5

3. Do you have a medical or managerial background? That is, do you have medical or non-medical (eg. administration) training?

1	2	3
Medical training	Administration training (not medical)	Both medical and administration training

4. Which of the following statements best describes the importance that you perceive IT (information technology and information systems) to be for your hospital?

6	5	4	3	2	1
I consider IT as the single most critical factor for the hospital	I consider IT as one of the vital parts of the competitive strategy	I consider IT to be vital for smooth functioning of operations	I consider IT to be one of the many ways to cut costs in the hospital	I consider IT to be the concern of technologists, not managers, although I am supportive of IT	I have little concern for the potential utility of IT

Optional Comment: _____

_____

5. How often do you get personally involved in matters related to the use of IT within your hospital?

5	4	3	2	1
daily	weekly	monthly	few times a year	less than once a year

Optional Comment: _____

_____

6. How frequent are your informal contacts with your senior IT manager?

5	4	3	2	1
daily	weekly	monthly	few times a year	less than once a year

Optional Comment: _____

_____

7. How knowledgeable are you about IT opportunities and possibilities for your hospital?

5	4	3	2	1
extremely knowledgeable	very informed	well informed	somewhat informed	weakly informed

Optional Comment: _____

_____

8. How knowledgeable are you about IT innovations that have been developed by other hospitals?

5	4	3	2	1
extremely knowledgeable	very informed	well informed	somewhat informed	weakly informed

Optional Comment: _____

_____

9. Which of the following best describes your prevailing thinking about funds the hospital spends on IT?

3	2	1
I view IT as an expense to be controlled	I view IT as a resource to be allocated fairly across organisational units	I view IT as a strategic investment

Optional Comment: _____

_____

10. How often do you endorse major IT investments that have not been endorsed by traditional justification criteria and procedures?

3	2	1
rarely	occasionally	frequently

Optional Comment: _____

_____

11. Which of the following best describes your role in the hospital IT steering committee?

5	4	3	2	1
I am the defacto steering committee	I chair an IT committee and actively participate in meetings	I am a member of the IT steering committee	IT committee exists, but with minimal input or awareness from me	no steering committee exists

Optional Comment: _____

_____

12. What is your vision for IT?

4	3	2	1
I have a strong, but generic vision (*"we will be the leader in hospital use of advanced IT"*)	I have a technical vision of how the hospital will use IT (*"we will install a database that keeps track of all patients"*)	I have a functional vision of how the hospital will use IT (*"95% of patient information will be correctly coded"*)	I have no vision for IT

Optional Comment: _____

_____

Thank you for completing this survey form. Please return it in the stamped addressed envelope. Write your name and address on the back of the envelope if you would like a copy of the findings of this research project.

CHARLES STURT
U N I V E R S I T Y

SENIOR IT MANAGER SURVEY FORM

Thank you for agreeing to provide information for our research project. This survey form is to be completed by the senior IT manager. It has been designed to collect information about your hospital and about the role your CEO plays in the use of information technology and information systems (IT) within your hospital, and contains nineteen questions.

The survey form is designed to be completed in around ten (10) minutes, to ensure that not too much of your time is taken. Nevertheless, the information you provide is important in assessing the role your CEO plays with respect to IT within your hospital, and we ask that you give it careful consideration.

On completion could you please return the survey form to us by post using the enclosed stamped addressed envelope.

Section I: asks about your hospital.

Section II: asks about your organisational status as senior IT manager within the hospital.

Section III: asks about the approach your CEO takes to IT within your hospital.

For each of the following questions you are asked to circle the number representing the ***most appropriate*** response.

SECTION I **Hospital Profile**

1. What is the size of your hospital?
(approximate number of maintained beds)

Optional Comment: _____

_____

2. What is the proportion of funds received by your hospital from a casemix formula?

5	4	3	2	1
mostly all	more than half	about half	less than half	very small

3. State the estimated proportion of funds received via casemix formula. %

4. How would you describe your hospital's use of IT (information technology and information systems)?

5	4	3	2	1
a leading hospital	close follower	middle of the pack	somewhat behind	laggard

Optional Comment: _____

_____

5. Is your hospital a private hospital or a public hospital?

SECTION II **Your organisational status as the senior IT manager**

1. What is the title of the person to whom you report?

_____

2. How many ***levels*** in the organisation hierarchy are you from the CEO?

1	2	3	4	5	6

3. Do you have an IT, administration or other (eg. medical) training?

1	2	3
IT training only	Administration training	Other training (specify below)

Other training (please specify)

_____

4. For how many ***years*** have you served as a senior IT manager?

1	2	3	4	5	More than 5

5. For how many ***years*** have you served as a senior IT manager in this hospital?

1	2	3	4	5	More than 5

SECTION III Chief executive officer (CEO) characteristics

1. Which of the following statements best describes the importance that your CEO perceives IT (information technology and information systems) to be for your hospital?

6	5	4	3	2	1
Considers IT as the single most critical factor for the hospital	Considers IT as one of the vital parts of the competitive strategy	Considers IT to be vital for smooth functioning of operations	Considers IT to be one of the many ways to cut costs in the hospital	Considers IT to be the concern of technologists, not managers, although is supportive of IT	Has little concern for the potential utility of IT

Optional Comment: _____

_____

2. How often does your CEO get personally involved in matters related to the use of IT within your hospital?

5	4	3	2	1
daily	weekly	monthly	few times a year	less than once a year

Optional Comment: _____

_____

3. How frequent are informal contacts between the CEO and the hospital's senior IT management?

5	4	3	2	1
daily	weekly	monthly	few times a year	less than once a year

Optional Comment: _____

_____

4. How knowledgeable is the CEO about IT opportunities and possibilities for your hospital?

5	4	3	2	1
extremely knowledgeable	very informed	well informed	somewhat informed	weakly informed

Optional Comment: _____

_____

5. How knowledgeable is the CEO about IT innovations that have been developed by other hospitals?

5	4	3	2	1
extremely knowledgeable	very informed	well informed	somewhat informed	weakly informed

Optional Comment: _____

_____

6. Which of the following best describes the CEO's prevailing thinking about funds the hospital spends on IT?

3	2	1
Views IT as an expense to be controlled	Views IT as a resource to be allocated fairly across organisational units	Views IT as a strategic investment

Optional Comment: _____

_____

7. How often does your CEO endorse major IT investments that have not been endorsed by traditional justification criteria and procedures?

3	2	1
rarely	occasionally	frequently

Optional Comment: _____

_____

8. Which of the following best describes the CEO's role in the hospital IT steering committee?

5	4	3	2	1
is the defacto steering committee	chairs an IT committee and actively participate in meetings	is a member of the IT steering committee	IT committee exists, but with minimal input or awareness from the CEO	no steering committee exists

Optional Comment: _____

_____

9. What is your CEO's vision for IT?

4	3	2	1
a strong, but generic vision *("we will be the leader in hospital use of advanced IT")*	a technical vision of how the hospital will use IT *("we will install a database that keeps track of all patients")*	a functional vision of how the hospital will use IT *("95% of patient information will be correctly coded")*	no vision for IT

Optional Comment: _____

_____

Thank you for completing this survey form. Please return it in the attached stamped addressed envelope. Write your name and address on the back of the envelope if you would like a copy of the findings of this research project.