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Management Capability: Is it possible to quantify for SME credit risk assessment?

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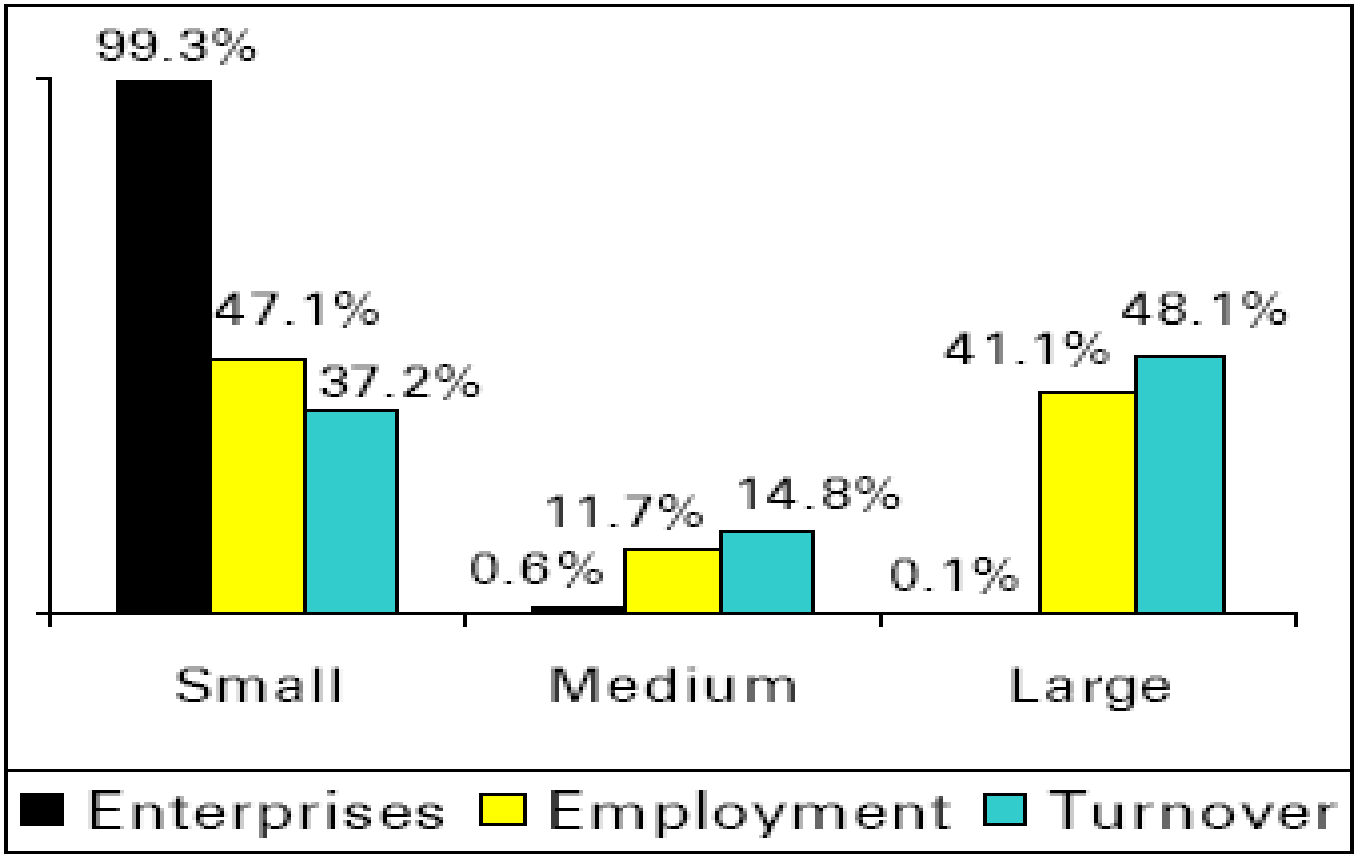
Significant contribution of SMEs to economy



Work already done

- **Yigui Ma, Shumin Lin (2010), 'Credit crunch' and Small and Medium-sized Enterprises: Aspects affecting survival, *Journal of Financial Services Marketing*, March 2010, Volume 14 Issue 4, pages 290-300.**

- **Jake Ansell, Galina Andreeva, Shumin Lin, Yigui Ma (2009), Experimenting with modelling default of Small and Medium Sized Enterprizes (SMEs), *175th Anniversary Royal Statistical Society.***

- **Yigui Ma, Jake Ansell, Galina Andreeva (2011), Management Capability: Is it possible to quantify? *Credit Scoring and Credit Control Conference XII*.**

Objective of this paper

This exploratory study aims to quantify qualitative variable Management Capability using quantitative transactional characteristics

To achieve this goal, employ Principal Component Analysis (PCA) and Partial Least Squares (PLS)

PCA vs PLS

	Characteristics of predictive variables	Relation between the predictive and target variables
PCA	Yes	No
PLS	Yes	Yes

Literature on Management Capability on corporate performance

• Haswel and Holmes (1989) report that managerial inadequacy, incompetence, inefficiency, inexperience is a consistent theme explaining small business failure.

• Keats and Bracket (1988) propose a conceptual model of small firm performance, based on strategic entrepreneurship and organizational theory.

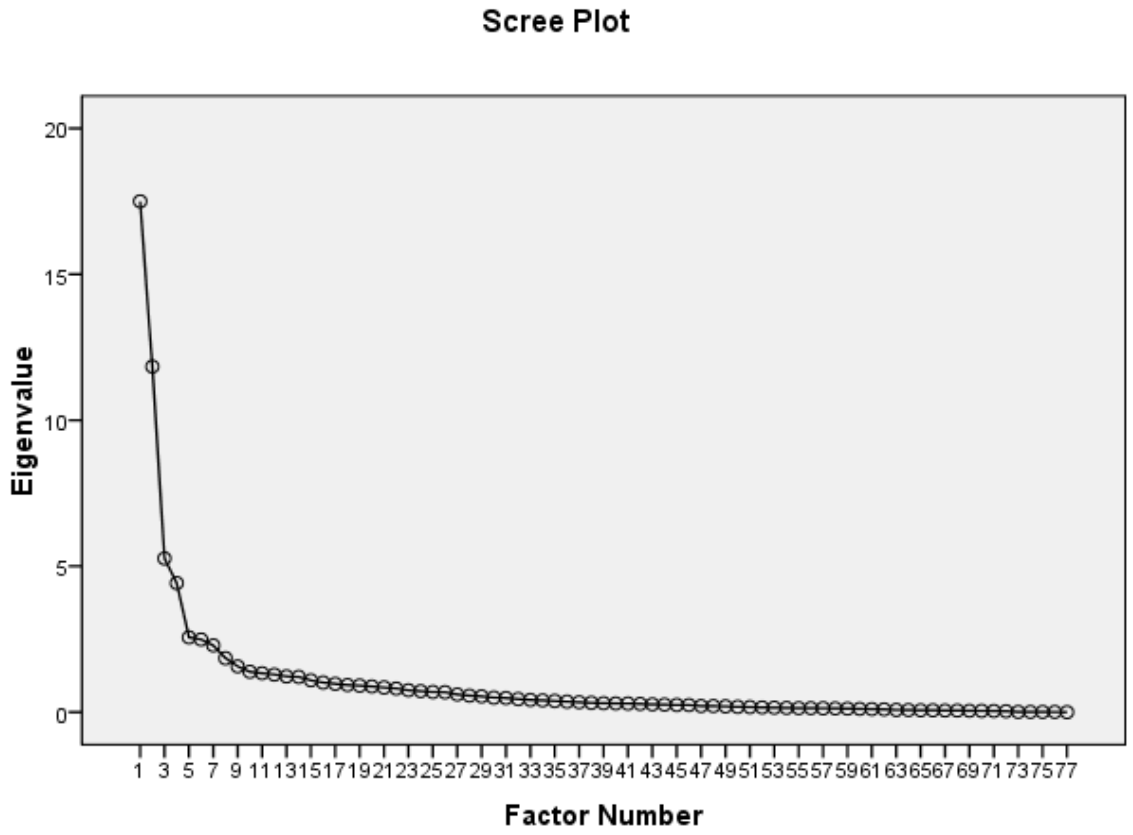
• Larson and Clute (1979) one of earliest empirical analysis, personal decision-based characteristics of the owner, managerial deficiencies and financial shortcomings

• Gaskill et al. (1993) find four factors play important role in explaining small enterprise failure, managerial and planning functions, working capital management, competitive environment and growth and expansion

• Ihua (2009) finds that internal factors such as management are the most significant factors for the UK SMEs

• Much of this previous research mainly focuses on the qualitative aspects; there is no paths exploration between qualitative based managerial capability with hard quantitative information.

Scree plot of principal components



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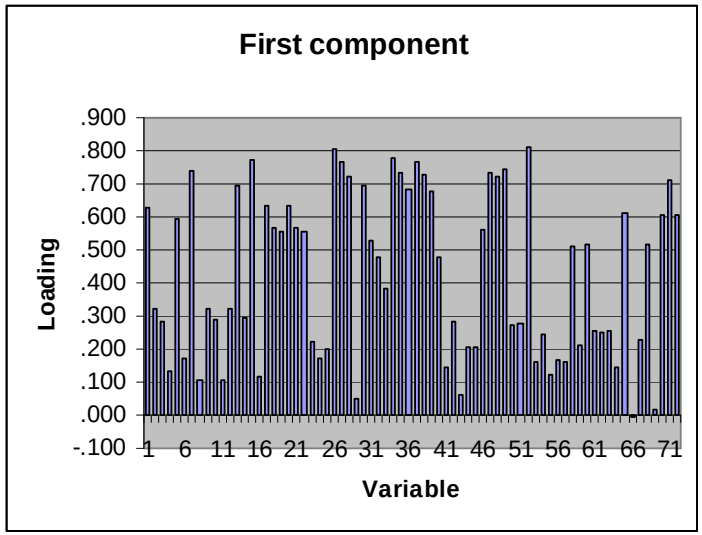
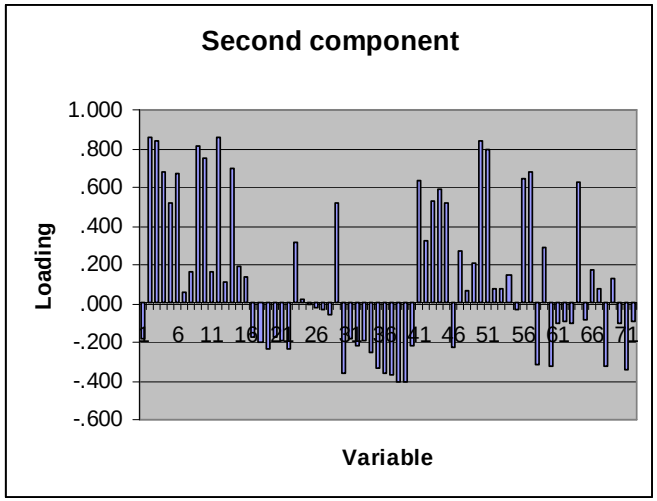
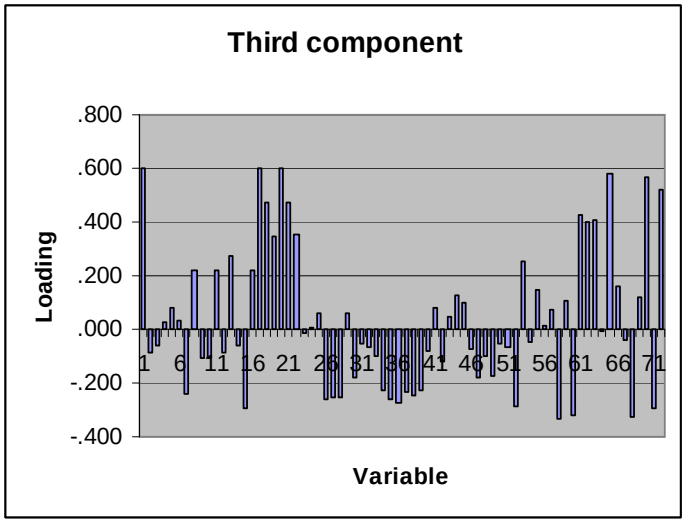
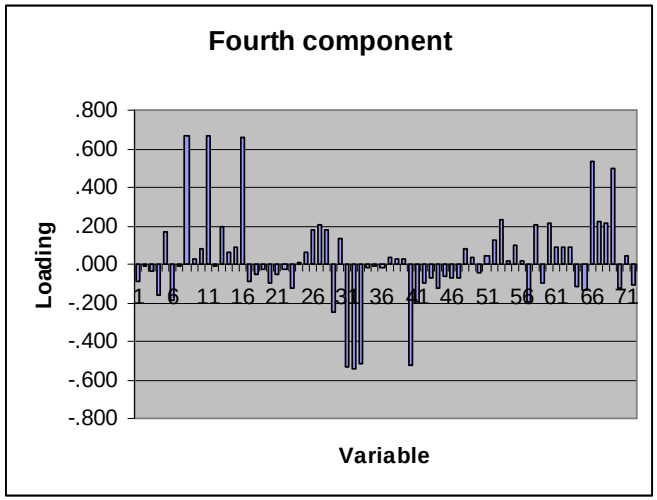
First four components of principal component analysis









Analysis of first four principal components

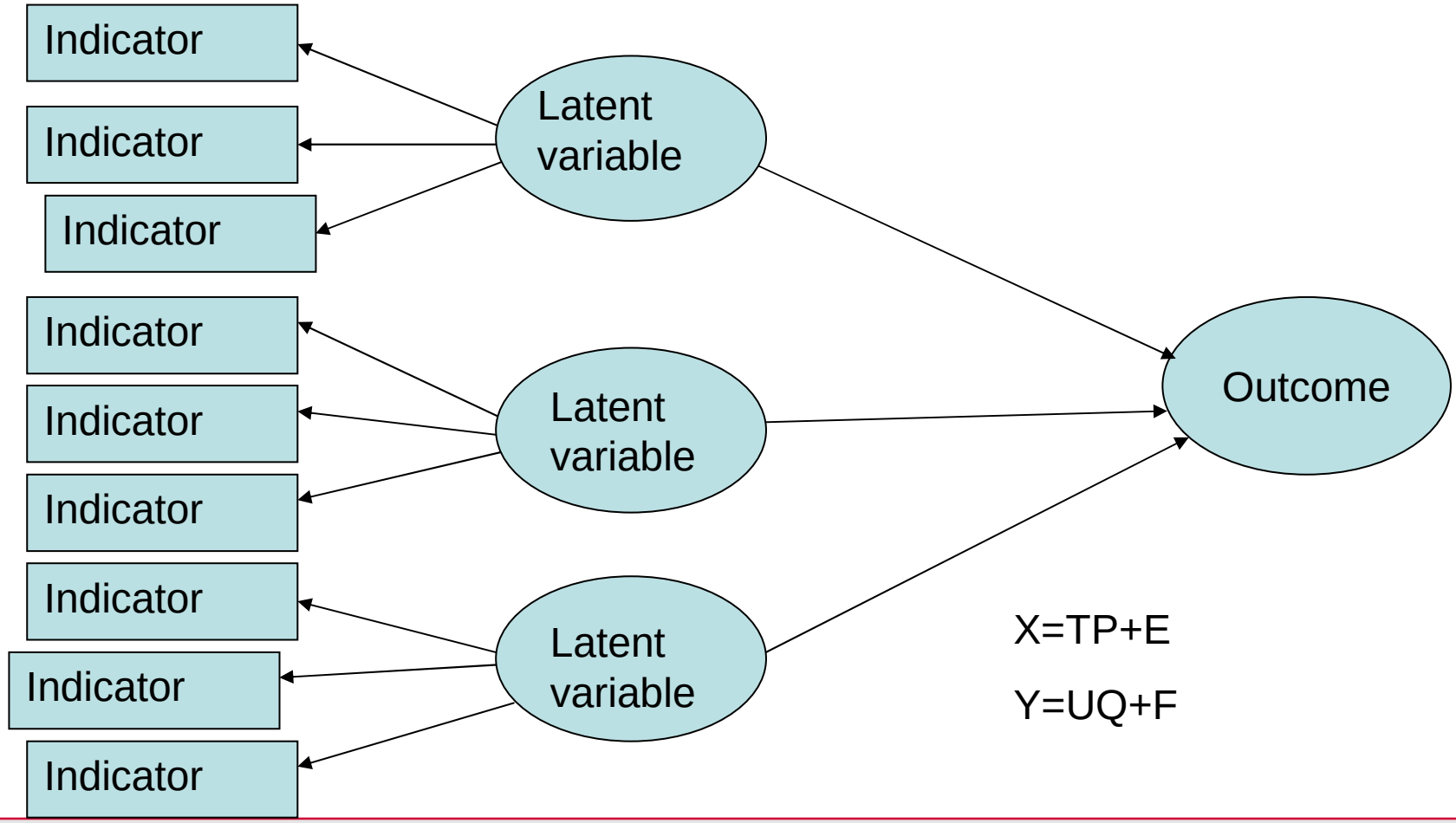
- First component does seem to be a measure of size with many variables contributing.

- Second component relates to the credit turnover and debit turnover. It is transactional accounting information. Good accounting control will not yield bad credit turnover and debit turnover. They can attribute to poor management ability.

- Third component is about the days the payment is in excess. It is connected with management capability, as good control of the account will not lead to days in excess. It is consistent with findings of Wichmann (1983).

- Fourth component is about the age of the account and balance.

Partial least square regression



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Test set validation for the number of extracted factors

Number of Extracted Factors	Root Mean PRESS	Prob > PRESS
0	0.999979	<.0001
1	0.821361	<.0001
2	0.77548	<.0001
3	0.771554	<.0001
4	0.764862	<.0001
...		
12	0.759508	0.0980
13	0.75945	0.1310
14	0.759397	0.2080
15	0.759351	1.0000

Minimum root mean PRESS	0.7594
Minimizing number of factors	15
Smallest number of factors with p > 0.1	13

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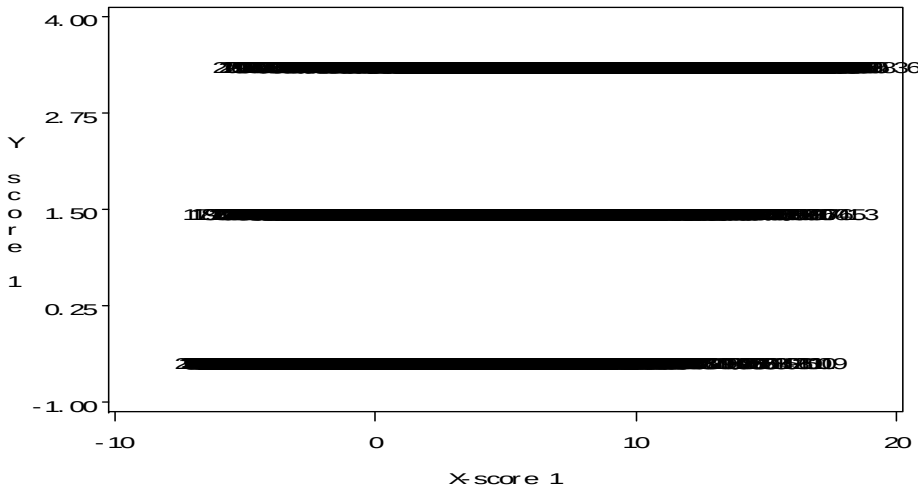
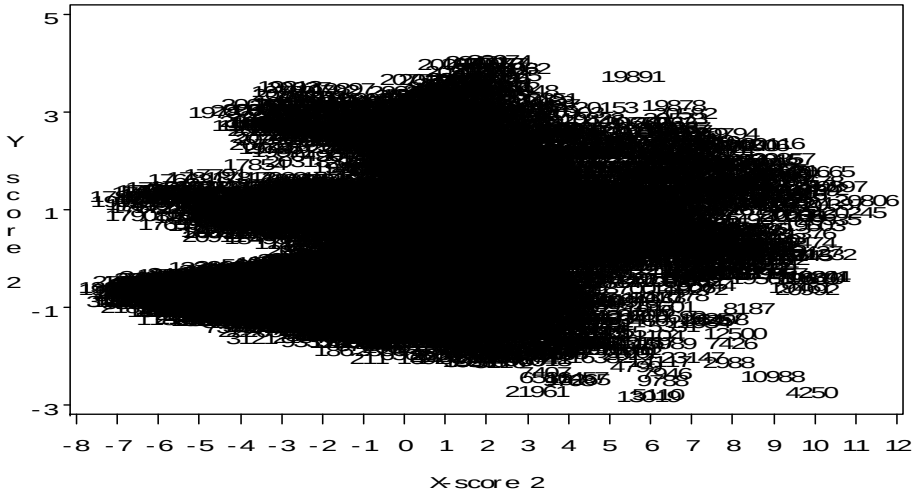
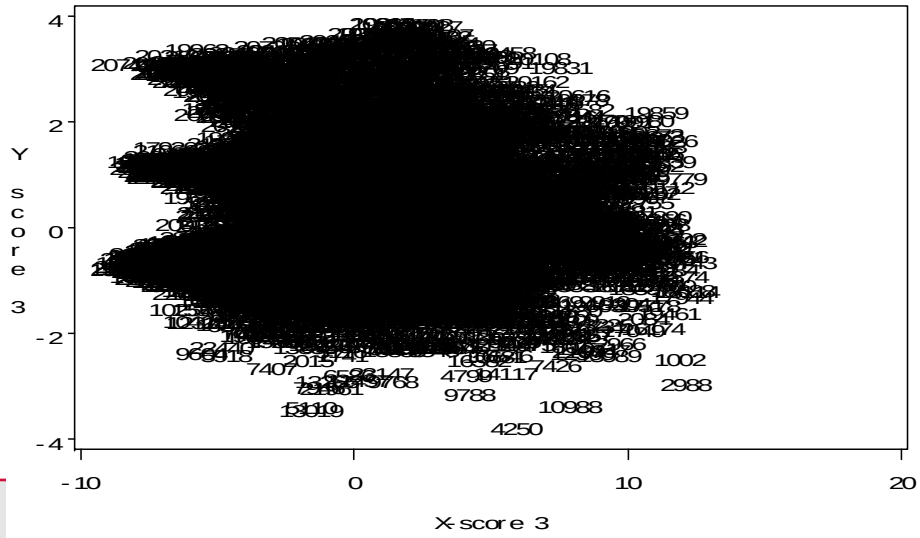
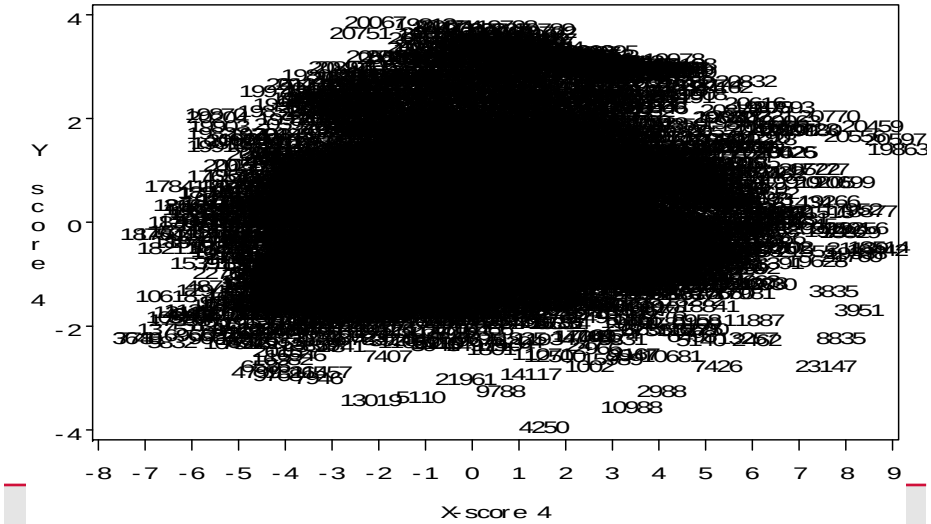
Correlation between first four X- and Y-Score









Percent Variation Accounted for by Partial Least Squares Factors

Extracted Factors	Model Effects		Dependent Variables	
	Current	Total	Current	Total
1	22.0336	22.0336	32.5338	32.5338
2	7.8299	29.8635	7.3268	39.8606
3	13.3754	43.2390	0.6073	40.4679
4	**3.8924**	**47.1314**	**1.0282**	**41.4961**
5	2.7098	49.8412	0.3536	41.8497
6	4.2068	54.0480	0.1267	41.9764
7	2.0428	56.0908	0.1263	42.1028
8	1.7314	57.8222	0.0808	42.1836
9	1.6771	59.4993	0.0478	42.2314
10	2.1300	61.6293	0.0284	42.2598
11	1.3348	62.9641	0.0310	42.2908
12	1.1473	64.1114	0.0215	42.3123
13	**2.0205**	**66.1319**	**0.0089**	**42.3211**

Criteria of factors to eliminate from analysis

- **The Variable Importance for the Projection (VIP) is small, Wold (1994) considers less than 0.8**

- **Regression coefficient (in absolute value) in the B matrix is small**

Variables retained in the analysis

- Average sum of days in excess (last 3 months)
- Average number of returned cheque of this month, last 3 months, last 6 months
- Maximum monthly CA and DA balance less CA limit
- Minimum monthly CA and DA balance less CA limit
- Customer generated credit turnover to worst net debt ratio
- Management score.
- Net balances of this month across all accounts
- Minimum debt of CAs and loans
- The worst consecutive Days Past Due during this month for the (worst) Cheque account open in this month.

Composition of first four factors from PLS

- First factor: Lots of variables contributing
- Second factor: Management score (loading 0.47)
- Third factor: minimum monthly cheque account and deposit account balance less cheque account Limit (loading 0.61)
- Fourth factor: Maximum monthly cheque account and deposit account balance less cheque account limit (loading 0.76)

Comparison of predictive power

	PCA Regression	PLS Regression	Ordinal Regression
Adjusted R-square	0.42	0.45	0.35
AUROC	0.86	0.88	0.89

Conclusion

• One could consider 2nd (financial measure) and 3rd (performance measure) components as reflecting management capability.

• It might be useful to extract the significant variables from these two components for use in subsequent modelling of default.

• PLS has the best model fit among three models. With first four factors, it is the better than PCA.

Thank you for your attention.

Q&A