RASCH MEASUREMENT THEORY IN VALIDATION INSTRUMENTS FOR ELECTRONIC FINANCIAL TECHNOLOGY IN MALAYSIA

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ABSTRACT

The study develops a new instrument in measuring the validity of the questionnaire in technology banking applications using the Rasch model as an alternative method. Usually, classical method, the Cronbach alpha (α), is used to prove the validity of the instrument. In addition, the Rasch measurement model is also capable of providing guidance to proof quality items to strengthen the legitimacy of the survey instrument. Questionnaire consisting of 28 items and using a 5-level Likert scale with very unimportant to very important as the form of semantic differential was distributed to 223 respondents. Bond and Fox software analysis showed different response patterns to construct items that were measured in the same logit. Findings show the more widespread application of Rasch models would lead to a stronger justification of measurement particularly in cross-cultural studies and whenever measures of individual respondents are of interest.

KEYWORDS**:** *Rasch, financial technology, measurement, validity*

1.0 INTRODUCTION

K-economy is a method for growth, and it revolutionizes the delivery of banking services with products such as internet banking and debit cards. To date, numerous studies have been conducted to investigate the factors influencing the acceptance of banking technology using different models and theories. The existence of e-banking (electronic banking) is expected to create new markets in the banking world and provide significant benefits to both parties, application providers and users, by reducing the use of cash. Technology in banking has become a platform for banks to introduce their products that provide more efficient services. A study by Sharma (2011) shows that e-banking is used as a strategic tool by the world banking sector to attract and retain customers. Besides that, the existence of information technology has enabled financial institutions to create, process and disseminate information quickly and cheaply (Ivo and Saskia, 2011; White, 2003). Furthermore, a study by Murillo, Gerard and Roberto (2010) on the adoption of internet banking among U.S. banks found that the role of internet banking is part of a bank's strategy and alternative abatement of opening new branches. Therefore, there is a need to evaluate the performance of e-banking development among Malaysian consumers. Feedback from respondents through questionnaires is often used to identify performance and consumer acceptance of electronic banking. Therefore, validation and strengthening of the questionnaire should be good and solid to support the objectives of the study. Confirmatory factor analysis and Explanatory factor analysis are the methods often used by researchers.

2.0 LITERATURE REVIEW

To analyze test items, there are two types of commonly used statistical items by Zhu (1998), a classic item statistics (CTT) which takes into account the item's difficulty and discrimination index, which refers to the aggregate statistical variance, covariance and means (Thomas and Rudolf, 2005). This method has the disadvantage in that its value depends on the population analysis, where the results will change when applied to different research groups due to the knowledge and skill levels of different samples. The second type of item statistics is derived from Item Response Theory (IRT), which contains the statistical difficulty of the item, calibration error and a correspondence item subset of the statistics that is able to estimate the extent to which an item complies with the expected model of knowledgeable respondents to have a higher probability in giving the correct answer. Item response theory methods are applied in the Rasch model to correct deficiencies in the Likert scale because the results are raw ordinal data, and it still needs to be processed because it does not have a regular interval. To improve the analysis, the method of Rasch measurement model (RMM) is used in this study as the primary objective is made by the best measurement. Rasch's measurement model established by Rasch (1980) is a measurement model that was formed as a result of the considerations on the ability of the respondents who answered the questionnaires, tests or instruments and the difficulty of each item (Rasch, 1980). Previous studies by Zamalia *et al*. (2013) and Rasch (1980) indicated that the Rasch theory was able to test the item's difficulty and the ability of respondents at the same scale.

Normally, the Cronbach's alpha (α) is only used to prove the validity of the instrument but Rasch measurement model is also capable of providing guidance to prove the quality of items to further strengthen the validity of the survey instrument (Azrilah *et al*., 2013). Rasch Measurement Theory by Georg Rasch comprises of a model of item response (IRT), which was later made famous by Ben Wright. Ordinal data does not have the same interval, so the data must be converted to the form of requirement ratio for statistical analysis. Rasch model was developed to determine the relationship between a person's ability and an item's difficulty where findings enable a high level of ability to be able to answer questions with a lower difficulty level (Bond and Fox, 2007).

Choppin (1983) provided explanations for the Rasch model in a mathematical equation. He essentially described that the probability in Rasch model is the result when the respondent can answer an item to disable that single feature and Rasch item. This is based on the assumption that certain individuals respond properly to a particular item and the item does not depend on the answer to the previous item.

$$\text{Probability } [X_{vi} = 1] = \frac{A_V}{A_V + D_I} \quad (1)$$

Where,

X_{vi} Value 1 if individual V responds to item i, and 0 otherwise
A_V Parameters reflecting an individual's ability v
D_I Parameters describing the item difficulty i

In this formula, A and D may vary from 0 to ___. Changes to these parameters are often introduced to simple mathematical analysis. New parameters are defined for individual ability ( ) and item difficulty ( ) to satisfy the equation:

A_v = W and Di = W for W constant.

Rasch introduced and used this equation in previous studies, for constant W is a fixed proportion to natural Logarithmic Base, e. Therefore, the model can be written as:

$$\text{Probability } [X_{vi} = 1] = \frac{e^t}{1 + e^t} \text{ where } t = (\alpha_v - \delta_i) \quad (2)$$

In this formula, α and δ can be taken into consideration for the ability and the difficulty of measuring respectively in the same logic scale. If

$\alpha > \delta$, the result of the probability obtained is the correct response, and if $\alpha < \delta$, the actual results are incorrect responses. Rasch also defined the ratio of the probability to obtain a probability than the one on display in the following simple equation:

$$\text{Odds}\,[X_{vi} = 1] = \frac{e^t}{1 - \frac{e^t}{1+e^t}} = e^t \quad \text{or } t = log_e(odds) \tag{3}$$

For these conditions, the Rasch model is sometimes called and referred to as 'log-odds' model (Choppin, 1983). Consider good ordinal score categorizing the data X_{nijk} for linear parameter equation (4) and (5) controlled by differential residual mean squares between data X_{nijk} in forecast model E_{nijk} to fit equation respondent to pattern measurement respond B_n.

$$\text{Infit} \qquad \sum_{ijk}(X_{nijk} - E_{nijk})^2 \,/\, \sum_{ijk} V_{nijk} \tag{4}$$

$$\text{Outfit} \qquad [\, \sum_{ijk}(X_{nijk} - E_{nijk})^2 \,/\, \sum_{ijk} V_{nijk} \,] \,/\, \sum_{ijk} 1 \tag{5}$$

A good subset of the statistics for each parameter measures expectations. Infit aim is to focus on the evolution of the reaction suitability as a conventional item with biserial correlation and IRT item discrimination. Advantage of infit is the variance ratio formula. The outfit is the variance ratio sensitive to outliers possible off-target and detects anomalies, such as guessing tough questions and the negligence of a simple question. Velo and Rosna (2009) stated that the types of responses on the Likert scale using Rasch model are good for studying the validity and reliability of the instrument to maintain the accuracy of the questionnaire from exposure to disability. It means the more accurate the data, the higher the value for the validity and reliability of the questionnaire. Rosenni *et al*. (2009 refer to reliability coefficient Cronbach's alpha to measure the reliability of the items in a questionnaire. It refers to the model that is commonly used on True Score Theory Test (TSTT), otherwise known as the classical model. Rasch model uses a mathematical formula that is roughly similar to the measurement of the parameters in the Item Response Theory (IRT), or also known as Latent Trait Theory.

Table 1: Criteria for the validity of the questionnaire items

Criteria	Statistics	Result
Validity Item	Polarity item	PTMEA CORR>0.3
	Item Fit	Mean square infit and outfit 0.6-1.4
	PCA	Varians 29.6%
	Respondent reliability	0.83
	Item reliability	0.96
Distribution of respondents	The estimated distance of understanding	4 logit (-1.0 hingga+3.0)
The validity of the response of respondents	Percentage of respondents mean square between 0.4 - 1.6	Infit 10.2% < 0.4 18.3% > 1.6 Outfit 11.5% < 0.4 15.6% > 1.6

Source: Bond and Fox (2007)

Table 1 shows Rasch's measurement, the validity of an instrument by reference to analysis such as polarity items, the item-person map, mismatch-individual items, item-individual isolation, unidimensional, compatibility and individual-item rating scale of (Rasch, 1980; Bond & Fox, 2007). Therefore, this study was undertaken to produce empirical evidence to strengthen the validity and reliability of the questionnaire for e-banking performance by using the Rasch's measurement model to test the questionnaire. According to Thomas and Rudolf (2005), the theoretical distinction between CFA and Rasch is that a CFA assumes metric scale even though we know it is doubtful while Rasch relies on the number of respondents and does not have normal or form set.

3.0 METHODOLOGY

The study obtained data from a sampling of 470 respondents from Malaysia. Testing instruments used the Rasch model via Bond & Fox software. The instrument included 26 questions based on seven (7) constructs to examine the performance of e-banking in Malaysia. Data analysis has been conducted in several stages to prove the normal distribution of the data and it is also a requirement to meet the conditions of the test statistics. All items in the questionnaire were measured using a Likert scale from 1 (strongly disagree) - 5 (strongly agree) based on several studies (Davis, 1989; Hung-Pin Shih, 2004; Yong, 2013; Pasharibu *et al*., 2012; Thompson, 2005; Chen *et al*., 2007; Widjayan, 2011; Hung-Pin Shih, 2004; Koi and Sze, 2002). The selection of the sample size of the study represents a population using the method by Krejcie and Morgan (1970), which was applied in this study based on the population of people aged between 15-74 years from a number of 18,931,200 people in 2013 (Malaysia, 2013).

$$SIZE = \frac{X^2 NP\ (1-P)}{\delta^2 (N-1) + X^2 P(1-P)}$$

X^2 = Chi-square value of 1 degree of freedom at the desired confidence level. (0.05)
N = Population size
P = The proportion of the population (assumed 0.50) maximum sample size
δ = The level of accuracy is expressed as a proportion (0.05)

s = {(0.05)^2(18,931,200)(0.50)[1-0.5]} / 0.05(18,931,200 – 1)+(0.05)^{2}0.5(1-0.5)

$$s = \frac{3.8416(9465600)(1-0.5)}{47328 + 0.9604}$$

$$s = \frac{18181524.48}{47328.96}$$

s = 384.15 ≈ 400 respondent

4.0 RESULTS AND DISCUSSION

Table 2 presents the summary of the statistics from Rasch's model analysis of 470 respondents who answered 26 items on the instrument. Table 2 presents a high person reliability index (0.95) and a high item reliability index (0.85). These are considered as a good index for both item and person.

Table 2: Summary of statistical instruments for respondent and item

Persons	470 Input			INFIT		OUTFIT	
	Score	Count	Measure	MNSQ	ZSTD	MNSQ	ZSTD
Mean	91.7	26.0	1.03	1.01	-0.9	1.00	-0.9
S.D	15.5	0.0	1.52	0.90	3.4	0.90	3.4
Person Reliability : 0.94							
Items	26 Input			INFIT		OUTFIT	
Mean	1579.3	448.0	0.00	0.99	-0.2	1.00	0.0
S.D	37.5	0.2	0.22	0.15	2.1	0.16	2.2
Item Reliability : 0.87							

Person Raw Score-to-Measure Correlation = 0.98
Cronbach's Alpha (KR-20) Person Raw Score Reliability = 0.98

The mean infit and outfit are 1.01 for person and 0.99 for items mean squares. This indicates that the item fulfills the requirement set by Bond and Fox (2007), where a value between 0.4 – 1.6 is accepted. The table also shows that the z-scores for infit and outfit are -0.9 (person) and -0.2 (items) respectively. This indicates that the data fits the model somewhat better than expected, which could be due to some redundant items. The data also shows an overall acceptable fit as the value for standard deviation for person (1.52) and item (0.22).

According to Rasch's measurement model, the validity of a questionnaire can be identified by analyzing the program output. The main output is a polarity item and should be referred to as a correlation coefficient-point measurement known as the point measure correlation coefficient (PTMEA CORR). In addition, values are also referred to individual items such as maps, the mismatch-individual items, item-individual isolation, unidimensional, compatibility and individual-item rating scale by Linacre (2003). If the PTMEA CORR is high, an item will be able to distinguish between respondents' capabilities. According to Linacre (2003), negative or zero value indicates joint response to the item or the respondent is contrary to the variables or constructs. The item sags if the value is less than 0.30 PTMEA CORR (Nunnally and Bernstein, 1994). Based on the analysis, PC4 items are removed because misfit is greater than the MNSQ Outfit > 1.6, as recommended by Bond and Fox (2007), which showed high validity and reliability for item in the questionnaire. Meanwhile, the PTMEA CORR is more than 0.30, i.e., from 0.65 to 0.83. It can be concluded that the items contributing to the performance assessment for e-banking questionnaire could discriminate or differentiate between the uses of e-banking applications for respondents.

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Easy    ------------------------------------------>  Difficulty
PERSON |ITEM
       |22 11  2 2212 12 1 221 11 11
       |0319843158772645832642756901
       |----------------------------
   381 +3443444434433433333334344443  00381P
   102 +2342445243353443433333443444  00102P
   147 +4334343353333434434433344334  00147P
   198 +4434433433344334343344344333  00198P
   341 +2432244444432344344444344334  00341P
    10 +4334443333443344334333344343  00010P
    65 +3443344341434343444333443343  00065P
   115 +3434433434444334333443343333  00115P
   173 +3343334333343344434343334444  00173P
   221 +4453444443343344334333333431  00221P
   339 +4353434333324324342334444434  00339P
   142 +2435133344444435234453433222  00142P
    90 +1433535221243324234354112345  00090P
   143 +2232433233343333434333333333  00143P
   153 +3333333333333333333333333333  00153P
   300 +3333333333333333333333333333  00300P
   323 +3343333233333333333333333333  00323P
   353 +3333333333334332333333333333  00353P
   295 +1532433331244533323321323423  00295P
   382 +1231133231142552453115553522  00382P
```

Figure 3: Guttman response pattern scalogram

To reinforce that there are two items PC3 (entry 20 no) and PC4 (19) should be eliminated in Table 3 with the MNSQ not meeting the minimum criteria proposed, strengthening the Rasch model is necessary for removal based on the analysis of data obtained support through Scalogram Guttman. Rasch measurement model states that items such as PC3 and PC4 show patterns of response that do not meet its tough item (Bond and Fox, 2007).

Infit MNSQ large items also display the probability that this item to filter individuals who are negligent in answering the questionnaire. This assumption is reinforced by the low PMC as shown in Appendix 1. Rasch measurement model suggests referring to Guttman Scalogram respondents as a means of detecting the occurrence of such a condition, such as in Table 3, which shows the number of respondents who answered the questionnaire with older respondents being competent and the item to the right is a difficult item. Excellent response of 90, 295 and 382 on the item PC3 (20) and PC4 (19) is unreasonable and is more likely a negligence (Azrilah *et al*, 2013), because the answer is more difficult and prone to errors in answering the questionnaire. This also proves that the Rasch Measurement Model and removal of the items have a reason and the reason allows the items to be removed by taking into account the difficulty of the items and the ability of the respondents to answer said items.

Person-item map is the last determination for the validity of our data and items. Figure 4 shows the capability of Rasch analysis to produce a mapping of the distribution of the items to the distribution of the ability or tendency of respondents. According to Bond and Fox (2007), the purpose of this mapping is to show the relationship between the ability of respondents and the level of difficulty of the items. Respondents with high abilities and items with the highest difficulty level are at the top of the scale, while respondents with low abilities and items at the lowest difficulty level are located at the bottom. This is because the measurement using the logit scale shown above is based on the simplest to the most difficult level. Since most of the respondents' level of ability is in the vicinity of the mean logit, the mean logit value of 0 was set for the item. Mapping depicts most individuals to have much higher ability levels to answer the most difficult item in the questionnaire. In Figure 5, it is seen that the most difficult item (PB1) is at the top of the scale and the easiest item (PC3) is located at the very bottom of the scale. The estimated distance for respondents to understand e-banking is approximately 3 logit (from -1.0 to +2.0).

```
PERSONS MAP OF ITEMS
               <more>|<rare>
    7         .####  +
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    6             .  +
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    5             .  +
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      R1          ##  |
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    3             .  +
               ####  |
      R2         .# S|
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    2          ####  +
            #######  |
      R3   .######  |
                .##  |
          .#######  |
    1        .##### M+
                .##  |
             .####  |
               .###  |T PB2  PB3
               ####  |S B4   EE2  PB1  PB4  SI3  SI4
    0         #####  +M B2   E2   EE1  EE3  PC1  SI1  SI2 SS1 SS2  SS3
                .##  |S B1   E3   E4   E5   PC2  SS4
     .############ S|T B3   E1
                .##  |
                .##  |
   -1           .##  +
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   -2            .# T+
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   -3                +
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   -4             #  +
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EACH '#' IS 4.
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Figure 4: Person map of items

5.0 CONCLUSION

Validity and reliability of each item in the questionnaire is important to ensure that accuracy and data entry are as intended and contribute to the validity and reliability of the results. If the reliability or validity of the questionnaire were high, then the questionnaire is reliable and valid. Although the questionnaire used by researchers has been previously tested for validity and reliability, the questionnaire should be tested again because the inference obtained is only suitable for the purpose and samples of the particular study, especially if it was analyzed using Classical Test Theory or True Score Theory Test (TSTT). In this study, by using the Rasch's measurement model, researchers have obtained high reliability of test of the items and they also indicate that the questionnaire is valid and reliable to measure e-banking. In addition, the questionnaires were administered to the convenience of the respondents, thus there were no mismatch problem items and respondents (50% fit) found during the process of data analysis. One of the advantages of modern psychometric methods is the ability to identify his formula items and respondents misfit. Respondents should be able to answer very clever questions easily. To obtain more accurate results and consistency, it is proposed for future research questionnaire to utilize the same data to test the construct validity using structural equation modeling method (SEM).

REFERENCES

Arsaythamby Veloo and Rosna Awang Hashim. (2009). Kesahan dan kebolehpercayaan alat ukur orientasi pembelajaran matematik (OPM). *International Journal of management Studies, 16*(1): 57-73.

Azrilah, A.,B., Saidfudin, M.,M. dan Azami, Z. (2013). *Asas Model Pengukuran Rasch. Pembentukan Skala dan Struktur Pengukuran*. Bangi, Selangor: Universiti Kebangsaan Malaysia.

Bruce Choppin. (1983). *The Rasch Model For Item Analysis*. CSE Report No.219. https://www.cse.ucla.edu/products/reports/R219.pdf

Bond, T.G and Fox, C.M. (2007). *Applying the Rasch Model: Fundamental Measurement in the Human Science*. New Jersey: Lawrence Erlbaum Associates.

Chun, D, C., Yi W, F., and Cheng, K., F. (2007). Predicting Electronic Toll Collection Service Adoption: An Integration of the Technology Acceptance Model and the Theory of Planned Behavior. *Transportation Research Part C, 15*:300-311.

Fred,D. Davis. (1989). Perceived Usefulness, Perceived Ease of Use and User acceptance of Information Technology. *MIS Quarterly. 13*(3). pp 319-340.

Sharma, H. (2011). Bankers Perspectives on E-Banking. *NJRIM, 1*(1): 71-85.

Ivo J.M. Arnold dan Saskia E. van Ewijk. (2012). The quest for growth: The impact of bank strategy on interest margins. I*nternational Review of Financial Analysis, 25*: 18-27.

Hung, P.S. (2004). Extended Technology Acceptance Model of Internet Utilization Behavior. *Journal Information & Management, 41*: 719-729.

Pasharibu dan John J.O.I Ihalauw. (2012). E-banking: What is in Prospects' Mind?. *Proccedings of the IEEE ICMIT,* 325-330.

Thompson S.H Teo dan Yuan, Y., Y. (2005). Online buying behavior: a transaction cost economics perspective. *The International Journal of Management Science, 33*: 451-465.

Widjana M.,A and Basuki, R. (2011). Factors Determining Acceptance Level of Internet Banking Implementation. *Journal of Economics, Business and Accountancy Venture, 14(*2): 161-174.

Loo, L., S., and Sze, M., K. (2002). Singapore's Internet shoppers and their impact on traditional shopping patterns. *Journal of Retailing and Consumer Services, 9,* 115–124.

Linacre, J., M. (2011). *Rasch Measures and Unidimensionality.Rasch Measurement Transactions.* 24:4: 1310. http://www.rasch.org/rmt/rmt244f.htm

Malaysia. (2013), Statistic Department.

Nunnally and Bernstein. (1994). Psychometric theory (3rd). New York: McGraw-Hill.

Hun, P.S. (2004). Extended Technology Acceptance Model of Internet Utilization Behavior. *Journal Information & Management, 41:* 719-729.

Roberto Fuentes and Rubén Hernández-Murillo & Gerard Llobet, (2007). "*Strategic online-banking adoption,*" Working Papers 2006-058, Federal Reserve Bank of St. Louis.

Murillo, R. H., Llobet, G., and Fuentes, R. (2010). Strategic Online Banking Adoption. *Journal of Banking & Finance, 34:* 1650-1663.

Robert V.Krejcie dan Daryle W.Morgan. (1970). Determining Sample Size For Research Activities. *Educational and Psychological Measurement, 30.* 607-610.

Rosseni, D., Mazalah, A., Faisal, Norhaslinda, M, S., Aidah, A, K., Nur, A, J., Kamaruzaman, J., Mohamad, S, Z., Khairul, A, M., and Sit, R, A. (2009). Validity and Reliability of the e-Learning Style Questionnaire (eLSE) Version 8.1 Using the Rasch Measurement Model. *Journal of Quality Measurement and Analysis, 5*(2): 15-27.

Salzberger, T., and Sinkovics, R., R. (2005). Reconsidering the problem of data equivalence in international marketing research Contrasting approaches based on CFA and the Rasch model for measurement. *International Marketing Review, 23*(4): 390-417.

Venkatesh, Morris, Davis G.B and Davis F.D. (2003). User Acceptance of Information Technology: Toward A Unified View. *MIS Quarterly, 27*(3): 425-478.

Benjamin D.Wright. (1996). Comparing Rasch Measurement and Factor Analysis. *Structural Equation Modelling, 3*(1): 3-24.

Thomas Salzberger and Rudolf R. Sinkovics. (2005). Reconsidering the problem of data equivalence in international marketing research Contrasting approaches based on CFA and the Rasch model for measurement. *International Marketing Review, 23*(4): 390-417.

Zamalia, M., Nor, A., and Rosli, A, R. (2013). Assessing Students' Learning Ability In A Postgraduate Statistical Course: A Rasch Analysis. Procedia - *Social and Behavioral Sciences, 89:* 90 – 894.

Zhu, W-M. (1998). Test equating: What, why, how? *Research Quarterly for Exercise and Sport, 1*: 11-23.

APPENDIX 1

ITEM STATISTICS: MEASURE ORDER

ENTRY NUMBER	TOTAL SCORE	COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTMEA CORR.	EXACT OBS%	MATCH EXP%	ITEM
11	1593	470	.49	.07	1.22	3.0	1.26	3.4	.68	64.0	57.6	PB3
10	1599	470	.46	.07	1.21	2.8	1.24	3.2	.67	59.8	57.8	PB2
9	1631	470	.29	.07	.99	-.2	.99	-.2	.71	65.3	58.3	PB1
15	1645	470	.21	.07	1.07	1.0	1.08	1.1	.73	60.7	58.4	SI3
16	1645	470	.21	.07	1.03	.5	1.05	.8	.71	63.3	58.4	SI4
7	1652	470	.17	.07	.92	-1.2	.93	-1.0	.72	68.1	58.5	EE2
12	1653	470	.17	.07	1.01	.2	1.01	.1	.72	64.0	58.5	PB4
24	1653	469	.15	.07	.89	-1.6	.89	-1.6	.75	65.9	58.5	B4
26	1662	470	.12	.07	.89	-1.6	.89	-1.5	.74	65.7	58.8	SS2
2	1664	470	.11	.07	1.11	1.5	1.15	2.1	.69	60.0	58.8	E2
13	1672	470	.06	.07	.78	-3.4	.79	-3.1	.76	69.2	58.9	SI1
8	1676	470	.04	.07	.84	-2.4	.83	-2.6	.73	68.6	58.9	EE3
25	1680	470	.02	.07	.97	-.4	.99	-.1	.71	62.6	58.9	SS1
14	1681	470	.01	.07	.94	-.9	.93	-1.0	.74	65.7	58.9	SI2
6	1684	470	-.01	.07	.88	-1.7	.86	-2.0	.72	68.6	59.0	EE1
22	1685	470	-.01	.07	1.08	1.2	1.05	.8	.71	63.7	59.0	B2
17	1686	470	-.02	.07	.90	-1.5	.90	-1.4	.74	68.1	58.9	PC1
27	1687	470	-.02	.07	.83	-2.6	.83	-2.5	.73	66.6	58.9	SS3
5	1707	470	-.13	.08	.90	-1.4	.88	-1.7	.73	66.2	59.0	E5
28	1707	470	-.13	.08	.86	-2.0	.85	-2.2	.76	68.4	59.0	SS4
21	1711	470	-.16	.08	.71	-4.6	.70	-4.6	.76	76.3	59.0	B1
3	1712	470	-.16	.08	.88	-1.8	.87	-1.9	.73	66.6	59.0	E3
4	1713	470	-.17	.08	.76	-3.7	.75	-3.8	.76	69.2	59.0	E4
18	1725	470	-.24	.08	1.00	.0	.99	-.1	.72	66.4	59.1	PC2
19	1727	470	-.25	.08	1.41	5.4	2.21	9.9	.58	63.1	59.1	PC3
1	1740	470	-.32	.08	1.35	4.6	1.32	4.0	.68	59.6	59.2	E1
23	1747	470	-.36	.08	.97	-.4	.96	-.5	.73	67.7	59.3	B3
20	1772	470	-.51	.08	1.44	5.7	1.35	4.4	.60	58.7	59.4	PC4
MEAN	1619.5	455.0	.00	.07	.99	-.2	1.02	-.1		65.4	58.8	
S.D.	41.0	.2	.23	.00	.18	2.6	.28	3.0		3.7	.4	