

**Understanding the (Prototype)**  
**Financial Summary Measure (FSM)**

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**PREPARED FOR:** David Porteous  
FinMark Trust

**PREPARED BY:** Research Surveys (Pty) Ltd  
The Atrium - 1st Floor  
Cnr Rustenburg Rd & 7th Avenue  
Melville  
2092  
Tel: (011) 712-9700  
Fax: (011) 712-9701

**CONTACT PERSON:** Neil Higgs  
Director  
Strategic Business Development Unit

# Contents

1. Introduction	4
2. The measure itself	4
<i>Description</i>	4
<i>Financial penetration</i>	5
<i>Physical access to financial institutions</i>	6
<i>Attitudes to money</i>	7
<i>Connectedness and optimism</i>	8
<i>The FSM itself</i>	9
3. Additional technical details	10
<i>Introduction</i>	10
<i>Financial penetration</i>	10
<i>Physical access to financial institutions</i>	12
<i>Attitudes to money</i>	12
<i>Connectedness and optimism</i>	12
<i>The FSM itself</i>	12
4. Concluding Remarks	14

Appendix



## Introduction

The overall objective of the FinScope project was to measure effective access to and use of financial services, along with how people manage their money and what drives financial behaviour.

A specific objective was also to deliver a segmentation or continuum of the financial market in terms of that access to financial services from those who have full access (the “fully banked”) through to those who have no access at all.

This was originally interpreted to mean a measure of the extent of financial product take-up, barriers to entry to formal financial institutions, physical and electronic access levels to banks, attitudes to money and banks, and financial knowledge. Whilst such a measure has been developed (it produces a score for an individual that lies between 0 and 100), it was felt to have major limitations in terms of the original objective by having too great a western/formal financial institution bias. It also, necessarily, has a notable correlation (albeit a non-linear relation) with income. Hence, whilst useful, it does not provide much more useful information than is already contained in measures such as LSMs.

Accordingly, this measure was considerably modified so as to provide a better picture that pays more attention to those people either just entering the formal banking sector or using other money management methods. This has resulted in a model that classifies people into *tiers* based on a variety of measures.

This document has two parts: the first describes the measure and its algorithm with a brief rationale for each part of the model, so that it can be used in other studies. The second part adds additional technical detail to provide readers with additional insight into the development of the measure.

## The Measure itself

### Description

The (Prototype) Financial Summary Measure (FSM) consists of four broad components that yield five diagnostic classification measures for any individual, as well as an overall classification measure, the FSM itself.

The four components are –

- ✓ financial penetration (take-up of a comprehensive list of financial services, both formal and informal);
- ✓ attitudes to money, this yielding two classifications, named -
  - financial knowledge and control; and
  - financial discipline;
- ✓ physical access to banks; and
- ✓ connectedness and optimism

The algorithm classifies a person into one of eight tiers for each of these five measures. A final (sixth) summary classification, the FSM itself, is the sum of these five measures rescaled back into eight tiers, so that each measure contributes the same weight in the final result. This could be further debated. Normally, all six classifications would be shown, with the FSM being used as the major class against which to profile people. So, for example, one would measure a person and classify them, perhaps, as –



- Financial penetration Tier 6;
- Physical access Tier 5;
- Financial knowledge and control Tier 6;
- Financial discipline Tier 5;
- Connectedness and optimism Tier 7; with
- FSM Tier 6.

This then provides a classification scheme as well as key diagnostics.

### **Financial penetration**

Given the original objective, at least a part of the FSM must measure the extent and the nature of financial products and services take-up. The list of relevant products and services (banking products, savings and investment products specifically and insurance/assurance products) in the FinScope questionnaire were grouped into eight tiers based on an analysis that examined how product usage patterns correlated via a Burt matrix/correspondence analysis approach. This yielded a product continuum that was then subjected to a scree analysis that aided in the allocation to tiers.

For each of the three categories of product or service (banking, savings and investment, and insurance/assurance products), a person's **highest** tier is calculated and the overall financial tier is a simple average of these three highest tiers (rounded).

The Tier Allocation Table (TAT) (with products in the order they appear in the questionnaire) is as follows:

General accounts and services	Have now and use
An ATM card	3
A debit card	5
A savings book	3
A Post Office savings account	3
Savings/transaction account	3
Current or cheque account	6
Credit card	5
Fixed deposit bank account	6
Garage/petrol card	7
Money market account	7
Mortgage bond or housing loan	6
House bought by borrowing from government scheme	5
House bought by borrowing money from employer/friend/family	5
Personal loan from a bank	5
Loan from a friend/family	2
Loan from an employer	4
Loan from a micro-lender (such as Credit Indemnity, Capitec etc)	4
Loan from a mashonisa/informal money lender	5
Vehicle finance	8
An overdraft	8
Store card where you buy on account and pay later (such as Edgars)	4
Store loyalty card that gives you cash back (such as Clicks)	5
Other club or loyalty cards	5
NONE OF THE ABOVE	1



Investments and savings	Have/do now and use	Insurance/assurance	Have now and use
Timeshare	6	Funeral policy with a big institution	4
Holiday home/investment in a second home	7	Life assurance policy	6
Investment in property/house/flat that you rent out	6	Retirement annuity	7
Investment in vacant land/plot	7	Provident fund	5
Investment in farm land	8	Pension fund	5
Investment in cattle/livestock	5	Endowment/investment policy	7
Unit trusts	5	Home owner's insurance	6
Shares on the stock exchange	8	Medical aid	6
Investment in your own business	7	Hospital plan	8
Investment in someone else's business	8	Medical insurance	8
Collectables (antiques/carpets/paintings/art/coins/stamps)	6	Insurance taken out to maintain credit payments	6
Off-shore investments	7	Disability insurance	8
Stokvel or savings club	2	Education policy	5
Burial society	3	Household contents insurance	8
Buying/making goods to sell	4	Car insurance	7
Running your own a business	6	NONE OF THE ABOVE	1
Lending to others and benefiting from their profit/interest	3		
Improving your home	4		
Buying and exchanging vouchers for cash or goods	5		
NONE OF THE ABOVE	1		

The advantage of this approach is that changes in the product/service list do not affect the whole algorithm – new products can be simply added to the appropriate tier and old ones deleted as necessary.

### **Physical access to formal financial institutions**

Access is a key indicator of both barriers to entry as well as of future delivery of financial services. Access in the FSM is summarised by two components. The questions and the Tier Allocation Table are as follows:

FOR BANKED PEOPLE, DEFINED AS HAVING AN ACCOUNT IN ONE OF THE DARKER PURPLE BOXES IN THE FINANCIAL PENETRATION MEASURE: what is the average time you currently spend travelling to get to the bank?	FOR UNBANKED PEOPLE (NO ACCOUNT IN ONE OF THE DARKER PURPLE BOXES): What is the main reason you do not have one of these accounts?
---	--

Under 5 minutes	8	<b>Reason or Reasons</b>	
About 5 minutes	8	Don't have a regular income/job/earn too little	1
About 10 minutes	7	Don't qualify to open an account	1
About 15-20 minutes	6	I prefer dealing in cash	4
About 20-30 minutes	5	It's expensive	2
About 30-45 minutes	4	The bank is too far from where I live	1
About an hour or more	3	Other:	3

The first question is a single response; the second can be a multiple response. The tier allocated to the individual is either the single response from the first question or the highest response to the second question. The time-taken question was chosen as it differentiated better and more consistently between people than did a cost-to-get-to-the-bank question.

The first question is as used in the FinScope questionnaire. There has been some debate around it being widened (operationally) to include nearest ATM – but this would yield responses different from those found in FinScope. This still needs discussion.



### Attitudes to money

The above two components (especially the financial penetration question) have an income correlation. Given the high Gini coefficient (measured as 60 based on monthly household income in the FinScope questionnaire), income almost always emerges as a key differentiator between people. Accordingly, for the last two components, relevant variables that were specifically NOT correlated with income were sought. These also had to differentiate between people in a meaningful way. A further requirement was that these attitudinal questions should be able to be answered by both banked and unbanked people equally easily. This was achieved by eliminating variables that did correlate with income or assumed, either implicitly or explicitly, a banked state. The remaining attitudinal self-descriptors were analysed via the same Burt matrix/correspondence analysis route, akin to a nominal-level factor analysis, to determine the underlying continua, if any.

Two such relevant continua emerged with respect to attitudes to money. The analysis allocates a score to each self-descriptor with which a person agrees. These are summed for that person and transformed so as to fall between 10 and 89.9. This is divided by ten and the integer value of this score is taken for that individual's tier allocation on the two attitudes to money continua. The scoring regimes and transformation formulae are given below:

Statements (agree responses)	Financial Discipline	Financial Knowledge and Control
Taking loans should be avoided as much as possible	3	
With money you trust your own experience and knowledge rather than advice/promises of others	-1	2
If you save/invest regularly, eventually the small amounts mount up and you'll be secure	3	
In times of need you would rather deal with people you know than with a large organisation	-1	
You would rather deal face to face with a person rather than with an electronic device, even if the device is quicker	-1	
When it comes to money young people know more than older people	-2	
You don't trust informal associations like savings clubs	-2	
You are prepared to learn how to use new technology	3	
You often don't feel in control of your finances	-3	-2
Banks take advantage of poor people	-2	
You love spending money to buy things even if you have to use credit to do so	-4	
When buying credit it ends up being more expensive than you thought it was	-2	
You try to save regularly	6	9
You do not like carrying cash	9	
You hate owing money to anyone	10	
When you make financial decisions, you like to get advice from family/friends	8	
Having a bank account makes it easier to get credit	4	2
To get ahead in life, one needs to take some risks	3	
You are worried that you won't have enough money for old age	7	-3
You prefer to save where money is safe, even if interest rate/return is a little lower	5	
You go without basic things so that you can save	7	
You know quite a bit about money and finances	7	6
You avoid banking machines such as ATMs as much as possible	-3	-2
You can easily live without having a bank account		-8
People often ask your advice on financial matters		10
You usually read the finance pages in newspapers and magazines		14
You are saving for something specific, such as a car, a holiday, an appliance or furniture		12
You have a good idea of what interest/returns you get on the money you save		12

The transformation formula for the Financial Discipline tier allocation is as follows:

$$\text{Tier}_{fd} = 1 + \text{INT}((0.83 (21 + \sum s_i))/10) \text{ where } s_i \text{ refers to the scores above.}$$



The formula for the Financial Knowledge tier allocation is –

$$\text{Tier}_{fk} = 1 + \text{INT}((0.97 (15 + \sum s_i))/10)$$

Both these classifications could probably be simplified, once their behaviour has been assessed.

### **Connectedness and optimism**

The FinScope questionnaire included the Research Surveys Everyday Quality of Life Index (*EQLi*<sup>TM</sup>). This is because any understanding of financial take-up must be influenced not only by wealth issues but also by an understanding of people's life circumstances, the major influences in their lives, their happiness levels and their level of connectedness with the world. A more complete description of this model is given in the Appendix. Necessarily, again, parts of the *EQLi*<sup>TM</sup> correlate with income, so that, while knowing the full measure is useful in terms of analysis of the full FinScope dataset, for the purposes of a key summary measure, only those components not correlated with income are necessary. These turn out to be the variables that describe how people are connected to their networks and how happy they are. Networks are important filters people use in processing information and making decisions. Happiness levels influence the confidence with which these decisions are taken as well as the level of involvement people use when processing information. This was felt to be a key indicator in showing how people might react to new financial ideas. Hence, this has been included as a specific component on the overall FSM, rather than just as a diagnostic. There may still be some debate around this decision.

The scoring regime and transformation formula are given below, following the same principles adopted in the attitudes to money measures.

Statements	Apply to me
I don't feel really well most of the time	-7
I consider myself physically fit	2
I feel lonely	-8
I feel alive and energetic	2
Generally I am a happy and cheerful person	1
I don't know very many people	-4
People very seldom ask me for my advice	-3
I have a varied life with lots of different activities	2
I don't feel I really belong - I want to be more accepted	-7
I regard myself as a spiritual person	1
I don't really have a really close relationship with anyone	-6
I have many dreams in life but will never achieve them	-4
I feel well and in good health	2
My life has meaning and purpose	2

Below is a list of statements that might or might not apply to you.  
Please indicate which ONE applies to you.

My life is close to my ideal	3
My life is fairly close to my ideal	1
My life is not close to my ideal	-3
My life is not at all close to my ideal	-9



$$\text{Tier}_{co} = 1 + \text{INT}((1.28 (48 + \sum S_i))/10)$$

### The FSM itself

The initial FSM was the simple (rounded) average of the five above tier levels. However, this results in an FSM distribution that, being the average of five reasonably independent means, has rather too low a standard deviation. It also turns out to be rather non-normal. The critical issue is that the low standard deviation and the rounding procedure yields very few people in FSM tiers one, two and eight. Accordingly, a transformation was applied that had the effect of increasing the standard deviation without changing the scale. This utilised an s-shaped curve of the form:

$$y = x/[x + e^{(a-bx)}] \quad \text{for } 0 = x, y = 1$$

In this case, in order to obtain a transformation that spread the distribution of people from the midpoint of the distribution, values of  $a$  and  $b$  that set  $y = x = 0.5$  were chosen. The relation between  $a$  and  $b$  is –

$$b = 2(a - \ln(0.5))$$

A final value of  $a = 2.2$  was adopted.

This yields eight tiers for the sum,  $S$ , of the five component measures (this sum ranging from five to 40) that classifies people as follows:

- Tier 1:  $S$ : 5 to 15 (637 in the sample; 25% of the weighted population)
- Tier 2:  $S$ : 16 to 18 (522; 20%)
- Tier 3:  $S$ : 19 to 21 (227; 8%)
- Tier 4:  $S$ : 22 to 24 (337; 12%)
- Tier 5:  $S$ : 25 to 27 (427; 14%)
- Tier 6:  $S$ : 28 to 30 (370; 10%)
- Tier 7:  $S$ : 31 to 33 (280; 6%)
- Tier 8:  $S$ : 34 + (184; 4%)

There is a case to break tier 1 into a tier 1a ( $S$ : 5 to 12 - 104 people; 4%) and a tier 1b ( $S$ : 13 to 15 - 533 people; 21%), as a means of allowing us to identify the extremely disadvantaged. Such people will probably not be found often in urban areas, so such a breakdown may not generally be necessary in normal banking studies, but it may be useful here.

Results of all six classifications would normally be shown. For example:

Tier (1 to 8)	
Financial penetration	7
Physical access to formal financial institutions	8
Financial knowledge and control	3
Financial Discipline - cautious/disciplined (high) to distrustful/credit dependent (low)	4
Connectedness and optimism	8
<b>FSM</b>	<b>6</b>

The FSM calculation is available in an Excel spreadsheet that computes all six tiers automatically.



## **Additional Technical Details**

### **Introduction**

A key approach in the development of the various measures that go into the FSM uses, as mentioned earlier, a Burt matrix/correspondence analysis approach. This approach was adopted because it makes no assumptions as to the ordinality (nominal, ordinal, interval, ratio) of the various scales used in the FinScope questionnaire. Further, it is based on the common finding that, especially in terms of attitudes and psychographics, and often in terms of aspects of behaviour, people generally fall along continua or spectra, and that real clusters, as marketers like to envisage them, are rare. In these situations, typical cluster analysis algorithms work by *producing* clusters, rather than by *identifying* clusters. Further, the process is heavily influenced by the variables chosen (adding even one new variable can dramatically change the result), by the choice of distance measure and the actual clustering algorithm used. As a result, such clusters are usually highly unstable and not readily reproducible.

A segmentation exercise should start with this notion of continua or spectra as a basic premise, and seek to use rather than hide this essential reality.

The approach is outlined in principle below.

The process of constructing each continuum involves first generating a matrix akin to a correlation matrix. For self-descriptors where an agree/disagree scale has been used, the “agree” responses to each indicator statement are tabulated as both rows and columns in a table. In some cases, a more complete use is made of the scale points by tabulating each scale point of each indicator statement as both the rows and columns in a single table.

These square tables (called Burt matrices) are then subjected to either Correspondence Analysis or Non-Metric Multi-Dimensional Scaling. This process is essentially similar to a principal components analysis but without the necessity of assuming that the (ordinal) scales used are interval – a generally unwarranted but common assumption. Such an approach also allows one to mix variables of different ordinality, so that it becomes a general and very robust technique.

When properly chosen indicator statements have been used, the analysis clearly reveals the relevant continua or gradients, the role that each statement plays in contributing to those axes, and the overall differentiating power of the axes. Ultimately, after eliminating duplicates and after some cleaning, what results is a set of scores for a relevant set of statements/items on a number of possible differentiating dimensions – these dimensions and weights can be likened to LSM-type constructions. The scoring regime is often scaled so as to produce a distribution that runs from 0 to 100, for ease of use and interpretation, although this is not always necessary.

As noted above, for the FSM measures, eight tiers were adopted and so a different scaling approach was used as already outlined above.

### **Financial penetration measures**

For the three financial products, the approach that put all scale points of all items into the input matrix was adopted. The distances between the scale points for each product individually were then calculated from the first two axes of the output. An extract of the output (for insurance/assurance) is given below. The maximum values can be regarded as an indicator of a product’s relative place in terms of financial penetration.



A scree analysis on the maximum scores was conducted to assist in the allocation of products to tiers.

			Max
Funeral policy with a big institution	Never/don't know	0	4.1
	Used to have	2.2	
	Have now	4.1	
Life assurance policy	Never/don't know	0	5.7
	Used to have	2.8	
	Have now	5.7	
Retirement annuity	Never/don't know	0	6.6
	Used to have	3.3	
	Have now	6.6	
Provident fund	Never/don't know	0	4.6
	Used to have	2.1	
	Have now	4.6	
Pension fund	Never/don't know	0	5.0
	Used to have	2.5	
	Have now	5.0	
Endowment/investment policy	Never/don't know	0	6.6
	Used to have	3.4	
	Have now	6.6	
Home owner insurance	Never/don't know	0	7.1
	Used to have	3.6	
	Have now	7.1	
Medical aid	Never/don't know	0	5.8
	Used to have	2.9	
	Have now	5.8	
Hospital plan	Never/don't know	0	9.3
	Used to have	4.7	
	Have now	9.3	
Medical insurance	Never/don't know	0	10.2
	Used to have	5.1	
	Have now	10.2	
Insurance you personally took out to m	Never/don't know	0	5.6
	Used to have	3.6	
	Have now	5.6	
Disability insurance	Never/don't know	0	8.6
	Used to have	4.3	
	Have now	8.6	
Education policy	Never/don't know	0	5.0
	Used to have	3.1	
	Have now	5.0	
Household insurance	Never/don't know	0	9.0
	Used to have	4.6	
	Have now	9.0	
Car insurance	Never/don't know	0	6.6
	Used to have	3.4	
	Have now	6.6	

The final tier table for financial products can be depicted as below. This reflects the same values given in the TAT earlier. The variance accounted for in the analysis used for the tier allocation was 65%.



	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Tier 7
Q2a misc products/ services informal/ formal	None	Loan - friend/family	Savings book ATM card Savings/trans a/c P O savings a/c	Store a/c card Employer loan Loan - micro-lender Personal bank loan	Loan - Mashonisa Club loyalty cad Credit card Store loyalty card Debit card House loan - friend/fam House loan - govt House loan - empl	Bond/motgage Fixed deposit Current a/c	Money mkt a/c Garage card
Savings and investments	None	Stokvel/savings club	Burial society Lending to others	Improving home Buying/making gds to sell	Unit trusts Vouchers Investment in livestock	Timeshare Starting a business Collectables Investment in property to rent	Investment in own business Investment in vacant land Off shore investments Hol home/second home
Insurance/assurance	None			Funeral policy	Provident fund Pension fund Education policy	Insurance for credit Life assurance Medical aid Home owner insurance	Car insurance Retirement annuity Endowment/invest policy

### **Physical access measure**

The physical access measure was initially generated in the same way but shortened for the FSM measure itself to include only the most differentiating components. The final tier allocation was done via an analysis that linked the products and access information (as well as the attitudinal variables discussed below). The data used for the tier allocation accounted for 70% of the variation in the input matrix.

### **Attitudes to money**

As noted earlier, attitudinal self-descriptors that did not correlate with income were sought. The “agree” responses of these statements were analysed using the same Burt matrix/correspondence analysis approach, with those that did not provide differentiation being deleted. This yielded what has been tentatively named the “Financial discipline” measure. It is more accurately described as a measure that runs from distrustful/credit dependent to cautious/disciplined. The variance explained by this measure accounts for 60% of the variation of the input matrix.

The second attitudinal measure in the FSM is what has been termed “Financial knowledge and control”. It was the first attitudinal measure derived but, in its original form, has a strong wealth correlation. Accordingly, it was re-derived with the strongest wealth-correlated components omitted. The new measure accounts for 37% of the variation in the input matrix.

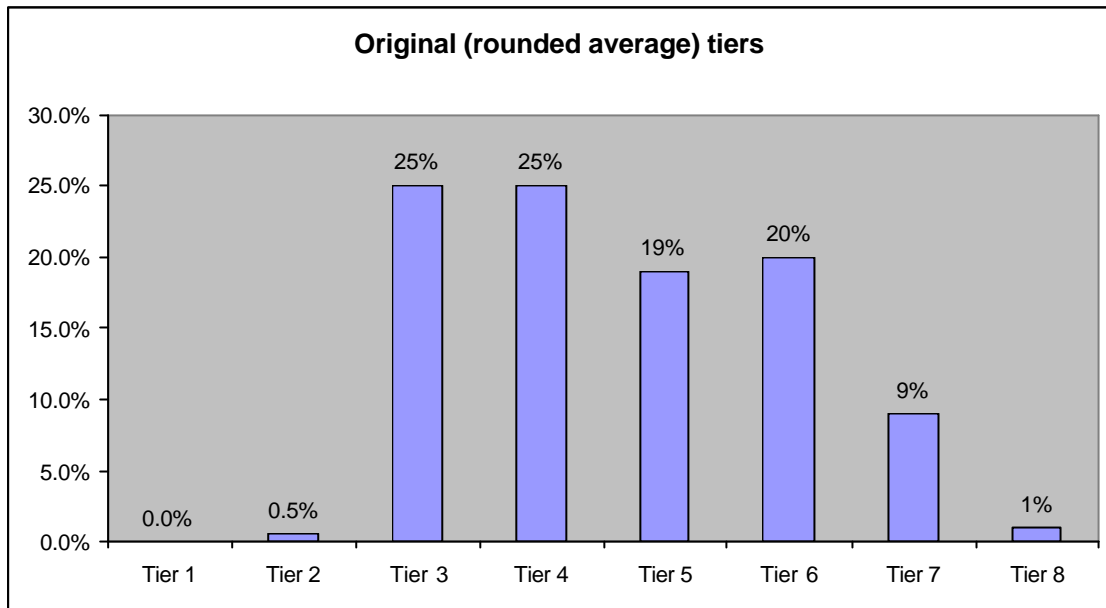
### **Connectedness and optimism**

The measure derived accounts for 36% of the variation in the associated Burt matrix. Other axes relate to health and fitness aspects, but this measure is the most general and accounts for the most variation.

### **The FSM itself**

The initial FSM was the simple (rounded) average of the five above tier levels. This yielded the following distribution of people:





This distribution, being the average of five reasonably independent means, has a relatively low standard deviation and is, accordingly, rather coarse. The simple rounding procedure also has the effect of truncating allocation to the extreme tiers.

Accordingly, a re-scaling and a transformation was sought that would correct this. This utilised an s-shaped curve of the form:

$$y = x/[x + e^{(a-bx)}] \quad \text{for } 0 = x, y = 1$$

In this case, in order to obtain a transformation that spread the distribution of people towards the ends of the distribution from its midpoint, values of  $a$  and  $b$  that set  $y = x = 0.5$  were chosen. The relation between  $a$  and  $b$  is –

$$b = 2(a - \ln(0.5))$$

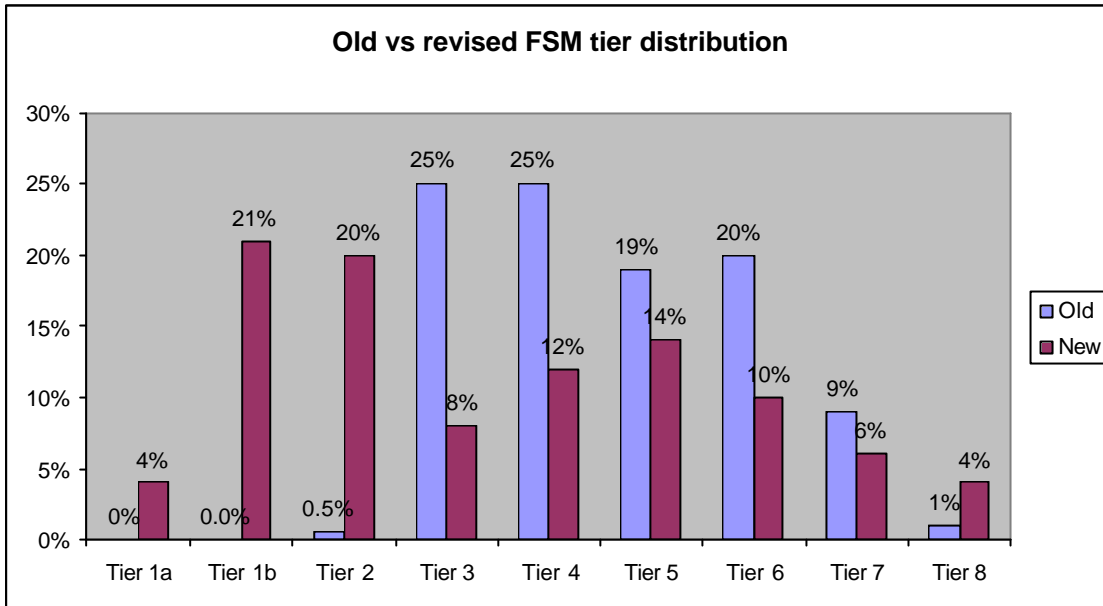
A final value of  $a = 2.2$  was adopted. This is, to some extent, a subjective choice. It was chosen as it gave class intervals that were approximately equi-interval for all tiers except the two extremes. Given the distribution of the sum of the five component tiers, it also gave the most useful spread of people from a usability point of view. Values for  $a$  between 1.4 and 2.7 were tested in the process.

The procedure involved re-scaling the original average tier scores to fall between 0 and 1, applying the transform and re-scaling the result so as to fall between 0.5 and 8.5 (to ensure correct rounding). The cut points for each tier were then examined in terms of the sum of the component tiers, leading to the definitions below.

- Tier 1: S: 5 to 15 (637 in the sample; 25% of the weighted population)
- Tier 2: S: 16 to 18 (522; 20%)
- Tier 3: S: 19 to 21 (227; 8%)
- Tier 4: S: 22 to 24 (337; 12%)
- Tier 5: S: 25 to 27 (427; 14%)
- Tier 6: S: 28 to 30 (370; 10%)
- Tier 7: S: 31 to 33 (280; 6%)
- Tier 8: S: 34 + (184; 4%)



There is a case to break tier 1 into a tier 1a (S: 5 to 12 - 104 people; 4%) and a tier 1b (S: 13 to 15 - 533 people; 21%), as a means of allowing us to identify the extremely disadvantaged.



### **Concluding Remarks**

The FSM has been applied to the FinScope dataset. The six measures are under examination as to their behaviour. Basic distributions are given in the Appendix.

The FSM algorithm has been produced with input from Darrell Beghin, Bob Currin and Michael O’Donovan, who all played a role in influencing the final choices of variables used. There has been limited testing of the algorithm by them and by Research Surveys in terms of its usability on a one-to-one level, and its reasonableness in terms of its results.

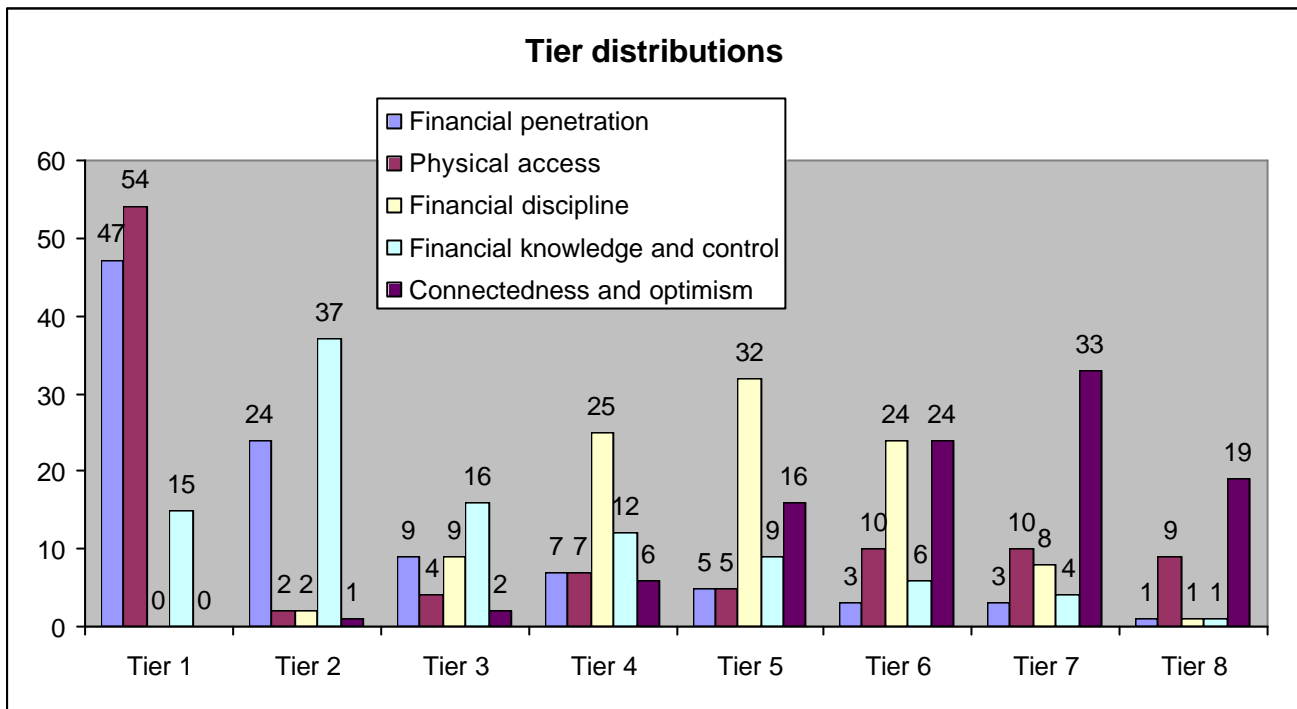
The algorithm should be regarded as a prototype and may well be streamlined and fine-tuned. Some possible areas where this might occur have been noted in this document. However, the FSM as it is now is felt to address at least a basic level the intent as conveyed by the FinMark team for such a measure.

We would like to thank David Porteous of FinMark Trust for his continued support in the development of the FSM.



## Appendix

### *Tier Distributions*



### *Outline of the EQLi™ model*

We can define overall well-being, or Everyday Quality of Life (EQL™) as follows:

*A person's overall well being or everyday quality of life is a function of the resources that a person has, various external factors that affect how that person is able to live (in the broadest sense), various internal choices and decisions that a person makes in living her or his life, how that person perceives his or her individual needs are being satisfied, and the resultant perceived level of subjective well-being or happiness.*

Therefore, EQL is a function of people's –

- circumstances, primarily their -
  - socio-economic status and poverty levels (*lack of basic amenities, lack of durables, lack of money for food*), level of urbanisation (*infrastructure, proximity to shops, relative space/mental horizons*) and living conditions;
  - health (actual and self-reported, including nutrition, stress, exercise and fitness); and
  - work and social environment, with special reference to pressure levels, support systems and interconnectivity (*size, influence, sense of belonging, self respect, support systems, relationships*), as well as coping mechanisms;
- perceived level of needs satisfaction (both basic and higher order); and
- overall satisfaction and happiness with their lives.

The EQLi™ consists of a parsimonious set of self-descriptors that provides a quantitative measurement of EQL that lies between 0 and 100. The EQLi™ contains the following sub-indices:



- Urbanisation Level Index (ULi)
- Poverty Level Index (PLi)
- Quality of the Environment Index (QEi)
- Overall Health Index (OHi) and Stress/Pressure Index (SPi)
- Needs Satisfaction Index (NSi)
- Connectivity Index (Ci)
- View of the Future Index (VFi)
- Subjective well-being (happiness) Index (SWBi)
- State of Mind Index (SMi)

**Detailed Everyday Quality of Life (EQL) Model**

