

Exploring Maslow's Hierarchy of Needs Empirically

by
Thor Dodson

A PROJECT

submitted to

Oregon State University

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degree of

Honors Baccalaureate of Science in Economics
(Honors Scholar)

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For each of the 5 needs in Maslow's motivational hierarchy (physiological, safety–security, belongingness, esteem, and self-actualization), measures of satisfaction were gathered from the German Socio-Economic Panel to assess their correlations with each other in order to test the validity of the structure of Maslow's hierarchy of needs. While other studies have analyzed such correlations, they were unable to decisively support or invalidate the hierarchy theory because correlation does not imply causation. Without determining causality it is impossible to distinguish between the hierarchy Maslow proposed and any other ranking through correlations alone. This study utilized instrumental variable regressions to determine causal relationships. By comparing regressions structured according to Maslow's hierarchy to unstructured regressions, a relationship between need satisfactions was found to exist but not necessarily in the order Maslow proposed.

Key Words: Econometrics, Psychology, Maslow, Hierarchy, Germany

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I understand that my project will become part of the permanent collection of Oregon State University, University Honors College. My signature below authorizes release of my project to any reader upon request.

Thor Dodson, Author

Introduction

Maslow, in his theory of human motivation, proposed a classification of human needs into five categories: physiological, safety/security, love/belonging, esteem, and self-actualization. Maslow proposed that these needs form a hierarchy in which the earlier needs, when not satisfied, supersede the later needs. However, the validity of Maslow's theory has been highly disputed. Past research has been insufficient in fully supporting or invalidating the theory partly due to conceptual, methodological, and measurement problems (Wahba and Bridwell 1979). Despite being controversial, Maslow's theory frequently recurs in the literature, and is thus worth exploring experimentally. While other studies have analyzed correlations between the needs, this does not infer causality between the levels like Maslow's hierarchy implies. In this paper correlations, regressions, and instrumental variables are used to determine causal relationships which challenge previous conclusions and find that need satisfactions are related to one another but not necessarily in the hierarchy Maslow proposed.

Literature Review

Defining Physiological (I)

In defining the needs, Maslow felt it was impossible as well as useless to make a complete list of physiological needs (1987 p. 16). Nevertheless, researchers attempting to investigate Maslow's theory empirically have often recognized needs for food, water, sleep, breathing, sex, and excretion as physiological. Taormina and Gao (2013) operationally defined physiological needs "as the lack of chemicals, nutrients, or internal (e.g., temperatures) conditions necessary for the body to survive, such that the extended absence of these things could lead to psychological stress or physical death". In this study satisfaction of the physiological need is represented by satisfaction with health.

Defining Safety-Security (II)

The next set of needs Maslow roughly categorizes as the safety needs. These include but are not limited to security, stability, dependency, protection, freedom from fear, anxiety, and chaos, and need for structure, order, law, and limits (Maslow 1987 p.18). In industrialized societies with high GDP per capita (such as Germany), there are seldom concrete threats to safety on a day-to-day basis. However, one does experience threats to one's position or lifestyle generating concerns such as job or financial security, discrimination, and even nihilism. Indeed Maslow felt these needs were most clearly seen in neurotic or near-neurotic individuals, and economic and social underdogs (1987 p. 18). In this study satisfaction with the safety-security need is represented by worry with one's own finances.

Defining Love-Belonging (III)

Once the physiological and safety needs are fairly well gratified, the love and belonging need arises. These needs partially stem from our deep animal tendencies to herd or flock together, and require relations with family, friends, lovers, and people in general to be satisfied (Maslow 1987 p. 20), Maslow points to the importance of having a strong sense of one's roots, groups, clans, and peers in psychological health. In this study love-belonging satisfaction is represented by how lonely one feels.

Defining Esteem (IV)

Strongly associated with love/belonging is the need for esteem. This need can be split into two categories: self-respect and respect from others. The need for self-respect manifests itself in the desire for strength, achievement, competence, confidence, independence and freedom (Maslow 1987 p. 21). The need for esteem from others is commonly associated with the desire for prestige, status, fame, glory, dominance, recognition, attention, importance, dignity, and appreciation (Maslow 1987 p. 21). When satisfied, esteem can lead to feelings of self-confidence, worth, and capability. When unsatisfied, feelings of inferiority, weakness, and helplessness can arise. In this study esteem satisfaction is represented by satisfaction with one's work.

Defining Self-actualization (V)

Self-actualization, the final and most abstract need, Maslow defines as people's desire for self-fulfillment and the tendency for them to become actualized in what they are potentially (1987 p. 22). The form this need takes is dependent on personal interest, ability, and the vague notion of one's true self. While the first four needs are motivated by a lack of something, self-actualization is growth-motivated rather than deficiency-motivated (Maslow 1987 p. 66). Self-actualization isn't satisfied extrinsically but rather continuously developed. As Maslow puts it "development then proceeds from within rather than from without, and paradoxically the highest motive is to be unmotivated and nonstriving, that is, to behave purely expressively" (1970 p. 66). In this study self-actualization satisfaction is represented by satisfaction with one's own leisure.

Previous Studies

One hypothesis implied by the structure of Maslow's hierarchy is that the level of satisfaction of any given need should be negatively correlated with desire for satisfaction of that need (Balloun and Graham 1973, p. 99). Balloun and Graham explored this hypothesis in 1973 and found significant negative correlations between a need's strength and its satisfaction. The correlations were stronger in between strengths and satisfactions of the same level as opposed to between levels, which Balloun and Graham felt lent some support to Maslow's theory concerning the relationship between satisfaction and desire and the ordering of human needs (Balloun and Graham 1973 p. 107).

Two similar studies explored the implication of Maslow's hierarchy that the satisfaction of a given need will be positively correlated with the strength of the next higher level need. Mild support was offered by Hall and Nougaim (1968) and Lawler and Suttle (1972) through the use of correlations. Both studies examined static and dynamic correlations of need strength and satisfaction measures. Hall and Nougaim (1968) found positive correlations between all of the need strength and satisfaction measures but the adjacent levels did not have higher values as predicted and no strong relationships were found to support the hierarchy of needs they hypothesized (p. 24). Likewise, Lawler and Suttle (1972) found a general tendency for the need strengths and satisfactions to be positively correlated, but few of their correlations were significant and ultimately the study offered little support for the view that the needs are arranged in a multilevel hierarchy (p. 282).

A study performed in 2013 by Taormina and Gao attempted to use correlations and regressions to show support for Maslow's hierarchy. Using questionnaire results from 386 adult respondents they found significant positive correlations between all of the need satisfaction measures, with stronger correlations between adjacent levels, supporting their hypothesis and

indicating Maslow's theory was correct. Additionally, they ran regressions on each need satisfaction using the preceding need satisfactions as well as demographics and exploratory variables as predictors. These regressions yielded positive coefficients, indicating a need's satisfaction could be partially predicted by satisfaction of the lower level needs, which was their hypothesis.

One common criticism of previous studies is that Maslow's theory is based upon causal logic, while most of the studies were correlational. Maslow's hierarchy suggests that the need satisfactions specifically impact each other from the bottom up, and correlation alone does not indicate the direction of causality. Similarly, a regression might indicate a variable is a good predictor of another, when they are actually codependent. It is also possible that one or more of the regressors are endogenous, making estimators biased and possibly inconsistent. This is quite likely when using self-reported statistics due to unmeasured individual characteristics such as personality or expectations.

Data

The data used is a sub sample of the GSOEP, a panel survey conducted yearly by the German Institute of Economic Research since 1984. The survey questions differ from year to year based on various interest groups, and in order to obtain the largest sample with regards to the relevant variables the data was restricted to the years 1990-1999. The data collected for this study is vast and heterogenous, containing 13,788 individuals of varying demographics including age, gender, education, occupation type, hours worked, income, marital status, and number of children. Additionally the CPI was included each year allowing for the calculation of real income.

When pooling the data either a balanced or unbalanced design is available. The balanced design is high restrictive and includes only units with complete observations at all points in time. In order to obtain more observations the unbalanced design was chosen for this study, and individuals that didn't provide any information for any one variable for any of the years were manually dropped. This way all individuals would have at least some observations for all of the variables. Some scaling of the variables was required as different scales were used in different years.

The variables measuring satisfaction are as follows (scale in parenthesis): satisfaction with health, worry with one's own finances, how alone one feels, satisfaction with one's work, satisfaction with one's leisure time, and overall satisfaction with life. Additionally these variables were collected to be instrumental variables: how often one is hindered by their health (physiological), worry about the development of the economy (safety-security), how much one is able to cope with everything (love/belonging), how much one enjoys their work (esteem), and if one worked for a reason other than to earn money (self-actualization). These instruments were chosen because they do not measure satisfaction, but rather are indicative of personality traits or neurosis. Unlike satisfaction measures they are independent of gratification, yet they still impact certain need satisfactions. Their impact is on a specific need, and they only influence the other needs through the need they are instrumenting.

Methodology

Maslow's theory indicates that the needs are satisfied in order of prepotency. To test this, correlations and regressions between the satisfaction measures of each need were computed (as in Taormina and Gao (2013)). While these correlations and regressions indicate a relationship between the variables, they don't necessarily prove it is a hierarchal relationship. In order to determine if Maslow's theory was correct and satisfaction of any one need depends on satisfaction of the lower level needs, regressions using instrumental variables were run on each need satisfaction using the lower level need satisfactions as regressors. Regressions were also run on each need satisfaction using all of the other levels as regressors to see if some hierarchy other than the one Maslow proposed is more appropriate.

A concern with the regressions was the presence of individual effects, such as personality or expectations, which could be correlated with the regressors. The Hausman test between random-effect and fixed-effect versions of the models failed for all of the regressions, confirming the presence of systematic differences between the coefficients of the regressions. By using a fixed-effect model, these differences are accounted for by a variable representing a time-invariant effect for each individual. The Hausman test between the fixed effect regression and the fixed effect instrumental variable regression also failed, confirming the presence of endogeneity and indicating that the use of instrumental variables made the model more consistent. The regressions take the form of...

$$\begin{aligned} \text{Basic Model:} & Y_{it} = \alpha_i + \beta_0 + \beta_1 * X_{1it} + \beta_2 * X_{2it} + \dots + \epsilon_{it} \\ \text{Hierarchal Model:} & HLN_{it} = \beta_0 + \beta_1 * LLN_{it} + \dots + Y * Demog_{it} + \dots + (\epsilon_{it} + \alpha_i) \\ \text{Non-Hierarchal Model:} & N_{it} = \beta_0 + \beta_1 * O_1N_{it} + \dots + Y * Demog_{it} + \dots + (\epsilon_{it} + \alpha_i) \end{aligned}$$

Where Y represents the variable being tested, α is the individual effect, β_0 is the constant, ϵ is the error term, and $\beta * X_{it}$ represent the regressors multiplied by their coefficients. The subscripts i and t stand for individual and time.

Results

Correlations

The correlations between need satisfactions showed mixed support for the hierarchal structure predicted by Maslow. All of the correlations were positive and significant, indicating a relationship between them. However, if Maslow's hierarchy is correct we would expect stronger relationships between adjacent needs (ie along the diagonal). This is not the case for any adjacent needs other than self-actualization and esteem. These results are depicted in Table 1.

Table 1. Correlations Between Satisfactions of the 5 Maslow Needs

Variable	I	II	III	IV
Physiological	--			
Safety-security	.17***	--		
Belonging	.19***	.14***	--	
Esteem	.39***	.26***	.16***	--
Self-actualization	.22***	.16***	.12***	.26***

*p<.1. **p<.05. ***p<.01. (I-physiological, II-safety, etc.)

Regressions

The fixed effect regressions with robust standard errors offered varying levels of support for the hypothesis that need satisfactions could be predicted by satisfaction of previous levels. The regression results are depicted in Table 2.

Table 2. FE Regressions of Need Satisfaction in a Hierarchal Structure

Variable	II	III	IV	V
Physiological	.03*** (.002)	.03*** (.004)	.31*** (.01)	.13*** (.01)
Safety-security	--	.08*** (.01)	.38*** (.02)	.06** (.02)
Belonging	--	--	.08*** (.02)	.06*** (.01)
Esteem	--	--	--	.12*** (.01)

*p<.1. **p<.05. ***p<.01

While all of the need satisfactions were statistically significant and positive, indicating previous levels are good predictors of higher levels, this only offers partial support for the hypothesis as many of the need satisfactions are likely endogenous. Compare this to the regressions run on each level using all of the other levels as predictors, as shown in Table 3.

Table 3. FE Regressions of Satisfaction in a Non-Hierarchal Structure

Variable	I	II	III	IV	V
Physiological	--	.01** (.002)	.03*** (.004)	.29*** (.01)	.13*** (.01)
Safety-security	.05** (.02)	--	.07*** (.01)	.37*** (.02)	.06** (.02)
Belonging	.09*** (.01)	.03*** (.004)	--	.07*** (.01)	.06*** (.01)
Esteem	.23*** (.01)	.04*** (.002)	.02*** (.004)	--	.12*** (.01)
Self-Act.	.09*** (.01)	.01** (.002)	.01*** (.003)	.10*** (.01)	--

*p<.1. **p<.05. ***p<.01

These regressions indicate that any need satisfaction will have a significant, positive impact on any other need satisfaction it is regressed onto. So any arranged hierarchy of these needs would be supported by the regressions and it is not clear from these models that the needs arrange themselves in the hierarchal order of prepotency Maslow proposed.

IV Regressions

The instrumental relevance test results are depicted in Table 4.

***Table 4. First Stage F-Test Results for Instrumental Variables**

Dependent	F-Statistics for First Stage Regressions				
	Sat. Health	Worry Finances	Lonely	Sat. Work	Sat. Leisure
Self-Act	414.4	364.4	212.6	458.6	--
Esteem	538.8	474.8	207.5	--	omitted
Belonging	534.2	469.7	--	611.2	omitted
Safety	538.6	--	282.8	599.0	omitted
Physiological	--	755.2	460.3	865.8	omitted

*The columns represent the dependent variables tested in all of the first-stage regressions, which were performed for each endogenous variable instrumented for, represented in the rows.

The instrumental variable regressions using previous levels as regressors offered mixed support for the hypothesis. These results are depicted in Table 5.

Table 5. FE IV Regressions on Need Satisfaction in a Hierarchal Structure

Satisfaction	II	III	IV	V
Physiological	.07*** (.01)	.09*** (.01)	.29*** (.03)	.13*** (.04)
Safety-security	--	.06 (.04)	.50*** (.10)	.07 (.10)
Belonging	--	--	.76*** (.10)	.50*** (.13)
Esteem	--	--	--	-.002 (.05)

*p<.1. **p<.05. ***p<.01

Safety-security and esteem were the only need levels significantly predicted by all of the preceding levels, and the coefficients were much larger for these regressions. While the regressions supported the hypothesis in regards to those two levels, it doesn't for satisfaction of belonging (III) and self-actualization (V). Compare this to the instrumental variable regressions run on each level using all of the other levels as predictors, as shown in Table 6.

Table 6. FE IV Regressions on Need Satisfaction in a Non-Hierarchal Structure

Satisfaction	I	II	III	IV	V
Physiological	--	.04*** (.01)	-.01 (.02)	.29*** (.03)	.13*** (.04)
Safety-security	.37*** (.07)	--	-.07 (.05)	.49*** (.10)	.07 (.10)
Belonging	.58*** (.09)	.28*** (.04)	--	.76*** (.10)	.50*** (.13)
Esteem	.06* (.03)	.00 (.01)	.26*** (.02)	--	-.002 (.05)
Self-actualiz.	omitted	omitted	omitted	omitted	--

*p<.1. **p<.05. ***p<.01. (Self-actualization was omitted due to collinearity of the instrumental variable.)

These regressions again show strong relationships between all of the need satisfactions, but not necessarily in any hierarchal format. Physiological satisfaction, supposedly the most prepotent need, was more strongly influenced by safety-security and belonging satisfaction than it influenced them. Safety-security satisfaction was more strongly influenced by belonging than physiological, defying the hierarchy. The regression on satisfaction of belonging countered the hypothesis the most, with physiological and safety-security satisfaction entering the regression negatively (albeit insignificantly).

Conclusion

This paper examined Maslow's theorized hierarchy of needs through the use of correlations and fixed-effect instrumental variable regressions. While the various need satisfactions were shown to be predicted by the lower level need satisfactions, they were also shown to be predicted by the higher level need satisfactions. These results suggest that although the need satisfactions are certainly related they are not necessarily related to one another in the hierarchal order of prepotency Maslow proposed.

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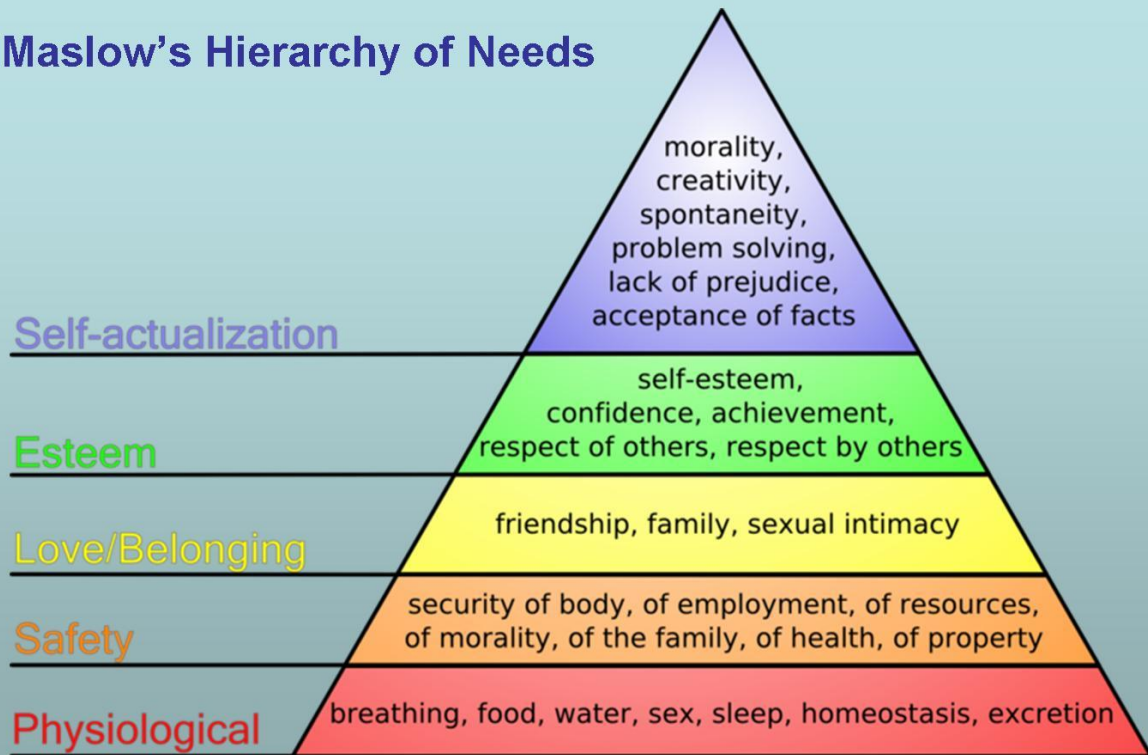
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Appendix

Table 6. Means and SDs of the Variables

Variable	Mean	SD
Sat. Health	6.87 / 10	2.2
Sat. Finances	2.03 / 3	.68
Lonely	3.30 / 4	.90
Sat. Work	6.98 / 10	2.1
Sat. Leisure	6.47 / 10	2.3
Hindered by health	1.36 / 3	.58
Worry Economy	2.24 / 3	.62
Barely able cope w/ all	1.79 / 4	.86
Don't enjoy work	1.75 / 4	.84
Work reason not money	.04 / 1	.20
Female	.47	.50
Number of Kids	.80	1.0
Education	11.4	2.5
Real Income	2568	1584
Work Hours	39.8	11.6
Birth Year	1956	13.9
Blue collar w.	.22	.42
Self Employed	.04	.21
Still Training	.03	.18
White collar w.	.23	.42
Civil w.	.03	.17
Married	.51	.50
Seperated	.01	.10
Single	.19	.39
Divorced	.05	.21
Widowed	.02	.14

Maslow's Hierarchy of Needs



From: Wikipedia – Spring 2007