Returns to Skill: Beyond Returns to Schooling

by

Sinduja Vivekananthan

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Queen's University

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Abstract

Labour and education economics literature has questioned the appropriateness of years of schooling as a measure of skill, despite its long standing use in determining returns to skill. Extending the work of Ingram and Neumann (2006) with more recent data, this paper uses occupation-specific data and factor analysis to identify specific skills that are required in the workplace. Demographic information from the Current Population Survey and National Longitudinal Survey of Youth 1979 for the years 2004-2010, and occupational information from Occupational Information Network is collected for the 2003-2010 period. Nine skills -critical thinking, physical skills, selling, technical skills, caregiving, attentional to detail, compliance, artistic skills and alertness- are identified from occupational characteristics, and are able to account for a significant portion of variation in weekly wages. Although it is expected that returns to education decrease when skills are considered, this is not always observed to be the case. It is also expected that returns to skills have been increasing over time, thereby substantiating the theory that higher returns to skills contribute to rising wage inequality. Trends in returns vary for each skill, so no overarching pattern is identified. Results suggest that the relationship between skill and education is not straightforward and requires more research.

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1. Introduction

Mincer (1974) popularized a human-capital earnings function, in which log wages are regressed on years of schooling and a quadratic years of experience term. This is meant to capture variation in earnings based on schooling and post-school investments in human capital. Often the term return to education is used interchangeably with return to school, because education is measured as years of schooling. However this measure could have more specific implications if returns to particular skills acquired through or outside of schooling could be separately identified. Increasing wage dispersion among individuals with the same level of education over recent decades, motivates further research into the idea that there is unobserved heterogeneity not modelled in the original human-capital earnings function (Neumann and Ingram 2006).

Acknowledging that skill consists of several dimensions outside years of formal education and experience, and identifying the individual returns to those dimensions is a useful addition to the labour and education economics literature. Although post-secondary school graduates earn more on average than high school graduates, tuition costs are rising and college graduates are mired with debt. Conflicting accounts of skills mismatches are also plentiful. Taking a deeper look into other dimensions of skill and their importance may shift more meaning from completion of school or attaining a degree to knowledge and experience acquired through schooling. It also may influence policy initiatives to also focus on methods of learning and skill acquisition other than formal schooling to reach out to as many individuals as possible.

Ingram and Neumann (2006) identify broad skills required in the labour market, and the returns to those skills. They use data from the Current Population Survey (CPS), Dictionary of Occupational Titles (DOT) and 1979 National Longitudinal Survey of Youth (NLSY) to analyze these returns to specific skills, and the residual return to education.

The paper also includes wage dispersion and employment information, and comparisons of results for “skilled” and “unskilled” workers using education and alternative skills to differentiate the two groups. This paper extends the returns to skill and education aspect of Ingram and Neumann’s paper for the 2003-2010 period. With new data and an evolved labour market landscape, core skills may have changed, as may have returns to those specific skills and returns to education.

The next section summarizes relevant research on the topics of wage inequality, standard measures of skill and factor analysis. This work motivates the importance of skills in the labour market, and the search for alternative measures of skill. Section 3 provides a basic explanation of factor analysis, the method used to identify and interpret skills in the data. Section 4 describes the data set that is used. Occupational information is taken from the 2002 Occupational Information Network (O*NET) and matched to occupations in the Current Population Survey (CPS) for factor analysis. Returns to education are calculated using these factor levels matched to occupations and demographic information from the National Longitudinal Survey of Youth (NLSY). Section 5 describes results from factor analysis and modified Mincer models that yield returns to education and returns to skill. Section 6 offers some concluding remarks based on these results.

2. Literature Review

Predicated on the idea that rising within-group[1] wage inequality can be explained by rising returns to unobserved skills, Ingram and Neumann (2006) determine returns to several typically unobserved skills. They use occupation information from the Dictionary

[1] In the context of this paper, within-group refers to individuals with the same level of education (having attended formal schooling for the same number of years.)

of Occupational Titles (DOT) to represent requirements and observed characteristics of occupations. Many of these characteristics overlap or are highly correlated with one another, so Ingram and Neumann use principal components analysis to limit skill types to four broad skills: intelligence, fine motor skill, coordination and strength. It must be noted that the skills that come from this analysis and that are discussed in this paper are not actually individuals' skills, but rather skills that individuals' occupations require. Individuals may not possess these skills and that may be reflected in their wage. To assume that occupation-specific skills are equivalent to individual skills would require the assumption that workers are perfectly matched to their jobs, and that would be a strong assumption to make. Ingram and Neumann include required skills in a modified Mincer equation. When broad skills are considered, returns to education fall as expected because the estimated return to education represents only returns which are not already captured by other skills. Thus, if schooling develops skills required for a job the return to schooling accounts for the difference in wages conditional on holding a job requiring that particular set of skills. Authors find that over a nearly thirty year period, median levels of intelligence increase the most, as do returns to intelligence. Opposite trends are observed for fine motor skills. Median levels of coordination increase slightly, as do returns to coordination. Physical strength is the only dimension of skill that displays different trends; median levels of strength decrease dramatically as returns to strength increase incrementally.

2.1 Wage Inequality

Ingram and Neumann attempt to reconcile an increase in returns to education and higher proportions of skilled workers in the labour market with increasing within-group wage inequality, all present from early 1970s to late 1990s. Several explanations have been proffered for this phenomena. Some are structural, such as a depressed minimum wage or weak labour unions that keep the lower tail of the wage distribution full (Dinardo et al. 1996). Weak labour market institutions could have caused increasing wage inequality in the eighties, but a consistently increasing 90/50 ratio[2] through the nineties and early 2000s casts doubt on them as a sufficient explanation (Autor et al. 2007).

A popular theory is that of skills-based technological change (SBTC), wherein rapid evolution of technology especially relating to computers causes an increase in demand for "skilled" workers who are able to productively use that technology. That increase in demand, in combination with fluctuations in the supply of college graduates drives up skill premia and widens the wage gap (Katz and Murphy 1992; Katz and Autor 1999). However, like the labour market institution argument, more recent research has revealed that SBTC might be more nuanced than originally thought (Goos and Manning 2003).Technology can automate routine tasks, but not non-routine tasks performed by "skilled" workers that require cognitive skills, and not non-routine tasks performed by "unskilled" workers that require manual skills typical of humans. As technological developments are integrated into the workplace, demand for jobs for high and low skilled workers increase, detracting from the idea that "skilled" workers drive up wage inequality. Card and Dinardo (2002) counter the SBTC theory based on wage inequality data that contradicts Autor et. Al (2007). They think that SBTC is a weak theory considering that wage inequality tapers off in the nineties, while technology continues to develop at a rapid pace.

Another explanation for increasing within-group wage inequality stems from the idea that groups of individuals who have the same level of education do not necessarily have equal skills (Juhn et. Al 1993). There are specific skills that often go unobserved,

[2] Ratio of wage at the 90th percentile to wage at the 50th percentile of the wage distribution

which may be driving up returns to education and filling out the upper tail of the wage distribution. Although none of these arguments hold up over time, and none alone can explain persistent rising wage inequality, in combination they may be able to explain a substantial portion of it. Ingram and Neumann (2006) explore the unobserved skill theory, which remains a viable cause of widening within-group wage inequality.

2.2 Measures of Skill

Another motivation of Ingram and Neumann's paper is that they, like others before them, believe that schooling is not an adequate measure of skill. Mincer (1974) claims that one of the main purposes of schooling is to develop skills, making years of schooling a suitable measure of human capital. It is sensible for years of schooling to represent some or most of individual human capital, but not all of it. Critics of the classic Mincer equation point out that ability is positively correlated with earnings. Individuals of higher abilities are likely to go farther in school, so if ability is not accounted for it upwardly biases the impact of education on earnings. Measures of ability, such as IQ or Armed Forces Qualification Test (AFQT) scores have been included to reduce this bias[3]. Instrumental variables (IV) for years of schooling have been used to overcome the endogeneity problem, but it is difficult to find appropriate instrumental variables. These issues of potential bias are likely to be present, regardless of the skill measure; human capital has intangible and immeasurable aspects that complicate research pertaining to it.

Alternative measures of skill are still worth considering, especially when taking into account recent developments in the world of education. Formal schooling can be rivaled or complemented by professional certifications, licenses or educational

[3] These scores may not completely capture ability, but including them is better than not including them.

certificates. Data from the Survey of Income Program Participation indicates that 25% of adults in the United States have one of the three previously mentioned “alternative educational credentials” (Ewert and Kominski 2014). That figure includes 11.2 million individuals with high school diplomas or less, implying that they have more skills than their years of formal schooling would suggest. It is also worth noting that professional certifications and licenses are more common among post-secondary graduates[4], suggesting that these qualifications are supplementing formal education rather than replacing it. Rampant availability of computers and education has made alternatives to formal education more prevalent. Massive open online courses and video hosting websites provide educational content on a variety of subjects, ranging from technical skills to university-level sciences, to the masses. Education is a signal to employers - a part of a job applicant’s image which he or she may make changes to – before they can get a true sense of the applicant’s abilities (Spence 1973.) Non-formal education may serve as a weaker signal than formal education, but again if these skills are additions to the ones gained through formal schooling, they can only improve an applicant’s image. In the long term, differences in wage can be attributed to the specific skills an individual possesses, as employers can assess an individual based on their performance, not just their education.

A unique aspect of Ingram and Neumann’s paper is that they use occupation-specific data to measure skill whereas other studies use individual data. Relying on occupational data removes the assumption that all individuals with the same demographic characteristics and same years of schooling have the same level of skills. However, it replaces it with the assumption that all otherwise identical individuals in an occupation are the same. Occupations are broad categories encompassing many jobs

[4] Recall that wage inequality is higher among college graduates than high school graduates.

and differences between jobs are not captured by this type of data. Occupation data may still be useful as 95% of adults in the US with professional certifications or license get them for work-related reasons (Ewert and Kominski 2014).

Some studies on returns to skills have used test scores as a measure of cognitive abilities (Blau and Kahn 2005; Hanushek et al. 2013). Blau and Kahn's results lead them to believe that although cognitive abilities themselves may explain some wage inequality, it is returns to both education and cognitive performance that are the larger causes. Hanushek et al. determine international returns to specific skills, and find that overall returns to numeracy and literacy skills are higher than returns to problem-solving. They acknowledge that these scores are not able to capture all variation in earnings, and address the strong link between assessment scores and years of schooling. Students who do well on standardized tests are likely to stay in school longer, so there is an interaction between the two variables which is unknown. A similar interaction is not drawn as clearly between years of schooling and occupation type. Pursuit of some occupations may require more schooling, but there are several occupations in which schooling may vary depending on the job.

2.3 Factor Analysis

Given all the returns to skill literature, it seems as though estimating returns based on occupation-specific data is a viable and worthwhile pursuit. Similar to Ingram and Neumann, other research uses factor analysis or occupational information to determine broad skills among labour market participants. Imai et al. (2014) use factor analysis on O*NET data to reduce occupational characteristics to five skills: analytical, interpersonal, fine motor, visual and physical strength. They compare skill requirements for occupations of immigrants in their native and host countries to see how well skills can be transferred across countries. They find that skills gaps are substantially large for immigrants with less than dominant language proficiency, and this has negative effects on earnings. By observing clusters that form among occupation characteristics, Abraham and Spletzer (2008) identify three dimension of skill: analytical, interpersonal and physical abilities. McLaughlin (1978) uses factor analysis to identify factors and the differences in their impact on wages between men and women. They identified four factors: cognitive skill, manipulative skill, social skill and strength. Cain and Treiman (1981) identified six factors: substantive complexity, motor skills, physical demands, management, interpersonal skills, undesirable working conditions. Despite differences in number of factors, the types of factors that emerge from occupation data are similar in these three studies, and in Ingram and Neumann's paper[5]. Factor analysis using more recent data might yield similar results or perhaps the changing landscape of the labour market is facilitating the emergence of different broad skills.

3. Methods

The two commonly used data reduction methods are factor analysis and principal components analysis (PCA). Sometimes PCA is considered a specific case of factor analysis, but this is untrue. They are two distinct methods that happen to yield similar results. Merits and limitations of each are widely cited in literature. Common factor analysis (CFA)[6] is a statistical method that explains common variation in observed variables with a smaller number of underlying latent variables called factors. Principal components analysis (PCA) is used to explain total variation in a data set with a smaller number of not necessarily latent variables called principal components. Whereas CFA is used to find unobserved variables that have impacts on observed ones, PCA is used to

[5] The intelligence factor in Ingram and Neumann (2006) covers characteristics that would be spread out between a cognitive skills and social skills.
[6] In this paper CFA abbreviates common factor analysis, not confirmatory factor analysis as in literature.

divide variables into broad categories. Although Ingram and Neumann (2006) use PCA, this paper will report results from CFA.

In the context of this paper, observed variables are scores assigned to occupational characteristics in O*NET, characteristics such as deductive reasoning, thinking creatively or interacting with computers. Factors and components can be broader skills such as analytical skill or technical knowledge. There are hundreds of variables in the data and many of them overlap or are highly correlated, so finding fewer unobserved variables that capture the variation of the original variables allows for simpler interpretation and more general takeaways from the data.

Common factor analysis is used to find common factors that can explain as much variation in the observed variables as possible. It is a “partial correlation approach” to finding underlying factors, with the idea being that when appropriate common factors are found and held constant, partial correlations between all pairs of observed variables tend to zero (Rummell 1970.) Variation in the data can be split into two types, common and unique. Common variation, communality, is the part of variation that can be explained by common factors. Unique variation, uniqueness, is the part of variation that cannot be explained by common factors.

Observed variables are linear functions of common factors.

$$X_1 = \alpha_0 + \alpha_1 F_1 + \cdots + \alpha_p F_p + \beta_1 E_1 \qquad (3.1)$$

The α’s are factor loadings, scalar weightings which represent the specific impacts of each of p common factors on variation in X_1. β is the impact of unique factor E on variation in X. The aim of factor analysis is to identify the common factors (F_k, k=1,…,p) and their loadings ($\alpha_1, \dots \alpha_p$.) When applied to an entire data set of n observations for m observed variables, this linear expression is composed of matrices.

$$\begin{bmatrix} X_{11} & \cdots & X_{1m} \\ \vdots & \ddots & \vdots \\ X_{n1} & \cdots & X_{nm} \end{bmatrix} = \begin{bmatrix} f_{11} & \cdots & f_{1p} \\ \vdots & \ddots & \vdots \\ f_{n1} & \cdots & f_{np} \end{bmatrix} \begin{bmatrix} \alpha_{11} & \cdots & \alpha_{1m} \\ \vdots & \ddots & \vdots \\ \alpha_{p1} & \cdots & \alpha_{pm} \end{bmatrix} + \begin{bmatrix} e_{11} & \cdots & e_{1m} \\ \vdots & \ddots & \vdots \\ e_{n1} & \cdots & e_{nm} \end{bmatrix} \begin{bmatrix} \beta_1 & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & \beta_m \end{bmatrix} \text{(3.2)}$$

also shown as

$$\mathbf{X} = \mathbf{FA'} + \mathbf{EB}$$

The F matrix contains values of p common factors for n observations. These elements are factor scores, and they represent the level of a latent factor for a particular observation. Uniqueness for each observed variable is captured by one factor, so unique factor loadings fill a diagonal matrix. It is assumed that unique factors are uncorrelated with common factors. The aim of common factor analysis is to find the elements of matrices F and A.

$$\mathbf{Z} = \mathbf{Z_c} + \mathbf{Z_u} \text{ (3.3)}$$

Z is a matrix with standardized values of the elements from **X**. The standardized observed data can be separated into a common part and a unique part. After applying the assumption that unique factors are uncorrelated with common factors, and some algebraic manipulation, a formula for factor loadings emerges.

$$\mathbf{R} - \mathbf{B} = \mathbf{AA'} \text{ (3.4)}$$

This formula is referred to as the fundamental theorem of factor analysis (Thurstone 1947) where **R** is the correlation matrix for **Z**. **A** can be determined from eigenvalues and eigenvectors of the matrix. The characteristic equation to solve is

$$|\mathbf{R} - \mathbf{B} - \lambda\mathbf{I}| = 0. \text{ (3.5)}$$

The roots of this equation yield eigenvalues, and from them eigenvectors can be found. Together, factor loadings can be determined from both of them, and common factors from loadings.

$$\mathbf{A} = \mathbf{E}\sqrt{\lambda} \text{ (3.6)}$$

A geometric interpretation of this process is that the common parts of observed variables form a vector space, and factors are the dimensions of this space.

When dealing with a large number of variables, it is difficult to find meaning from their variances or correlations. PCA transforms p variables into new m variables which capture most of the original variance and covariance. Principal components are linear functions of observed variables. Assume **x** is a vector of observed p variables and **α** is a vector of p scalars. Equation (7) contains elements of x that have the most variance. The next principal component (8) should be uncorrelated with $\boldsymbol{\alpha_1}'\mathbf{x}$ and has the most of the residual variance in the data. There are ideally m principal components, where m<p (Jolliffe 2002).

$$\boldsymbol{\alpha_1}'\mathbf{x} = \alpha_{11}x_1 + \cdots + \alpha_{1p}x_p \text{ (3.7)}$$

$$\boldsymbol{\alpha_m}'\mathbf{x} = \alpha_{m1}x_1 + \cdots + \alpha_{mp}x_p \text{ (3.8)}$$

PCA assumes that all variation in data can be explained by unobserved factors, whereas CFA assumes that a proportion of variation can be explained by factors. In this sense, CFA is a more conservative estimation method. CFA results can be manipulated to yield substantially different interpretations of the same data. Critics often cite this as a reason to use PCA, but CFA is an exploratory tool that is used to gain some understanding of existing relationships in the data; no robust conclusions are drawn from this analysis. Returns to underlying factors are calculated and if significant, suggest further research in returns to skills using more thorough methods. It seems more interesting to find underlying latent skills, so CFA is used.

4. Data

To extend the literature of Ingram and Neumann (2006), CPS labour market data from 2003-2010[7] is used. Unlike the study on which this paper was built, occupational characteristics will not be extracted from the DOT. In the late 1990s, the DOT was phased out and the Occupational Information Network (O*NET) was phased in. The O*NET system started out as a more accessible version of the DOT, but it has become increasingly more detailed, both in the numbers of occupational characteristics and occupations observed. A Census to Standard Occupational Classification (SOC) crosswalk is used to match occupation codes from the census to the SOC. In O*NET files, these SOC codes correspond to O*NET-SOC occupation codes and scores for occupational characteristics. There are 235 occupational characteristics, grouped into seven categories: ability, interest, knowledge, skill, work activity, work context and work value (A1). All variables are measured on scales on which a lower number signifies less of the characteristic. The ranges of the scales vary, so standardized values of the scores are taken. There are more occupation types in O*NET than in the SOC, so sometimes scores of relevant O*NET occupations are averaged and matched to an appropriate SOC code.

After factor analysis is performed, skill levels are matched to occupations and demographic data taken from the National Longitudinal Survey of Youth 1979 (NLSY79)[8] for the 2003-2010 time period. This data is used to calculate the return to education and returns to skills. Race and sex are measured by indicator variables. Earnings are measured as log weekly wages, which are calculated by taking the log of the product of

[7] The 2002 O*Net database is the last version released before voluntary information was included. The CPS used 2002 Census occupation codes until 2011, so the chosen time period is the most consistent for data purposes.
[8] Only data from alternating years is found from the nlsinfo.org website

weekly hours and hourly wage. Observations are included only for full-time workers (more than 30 hours a week). Education is measured as the highest grade level an individual has completed and experience is calculated as age minus years of schooling minus six. The revised AFQT-2 percentile score[9] is used. Although this paper deals with required skills, not individual skills, following Hanushek et. al (2013) the sample includes only individuals who are between 25 and 55 years of age to increase the likelihood of an individual being well-matched with their occupation. Observations with missing values for occupation, weekly wage, skills, AFQT score, and years of schooling are excluded.

There sample has an approximately 60/40 ratio of males to females and white people to colored people (Table 1). Mean AFQT score is in the 44th percentile, and mean years of completed schooling is 13.54, which is equivalent to a high school plus a year and a half of postsecondary schooling. Because the sample is restricted to 25-55 year olds, the majority of experience varies between 17 and 32 years. Weekly wage is almost six times higher at the 90th percentile than it is at the 10th percentile. This sample is ideal for examining returns to required skills because it contains within-group wage inequality. Mean required skill levels are approximately zero, and the 10th and 90th percentiles are mostly around -1 and 1 respectively. This makes sense because levels are in terms of standard deviations from the mean.

Table 1. Summary statistics for 2004-2010 NLSY observations, N=11441

	Proportion (%)
Sex	
Male	61.48
Female	38.52
Race	
White	59.36
Non-White	40.64

[9] Revised to compensate for test-takers receiving slightly different tests, resulting in slightly different completion rates

	10th percentile	Mean	90th percentile
AFQT	6	44.22	87
Education	12	13.54	17
Experience	17	24.80	32
Weekly Wage	320	1028.25	1903.5
Critical Thinking	-1.10	0.18	1.52
Physical Skills	-1.06	-0.01	1.5
Selling	-1.28	-0.07	1.08
Technical Skills	-1.08	0.08	2.04
Caregiving	-0.96	-0.08	1.32
Attention to Detail	-1.34	-0.01	1.16
Compliance	-0.95	0.05	1.16
Artistic Skills	-1.02	-0.09	0.93
Alertness	-0.89	0.11	1.08

5. Results

5.1 Factor Analysis

Before proceeding with factor analysis, one must confirm that the CFA can be appropriately applied to the particular data set. The Kaiser-Meyer-Olkin (KMO) measure is calculated for all variables to ensure that there is sufficient correlation between variables. The majority of scores are between 0.8 and 1 and the overall score is 0.94, indicating that factor analysis is suitable for use. It is recommended for there to be several times more observations than observed variables to get reliable results. This is not a problem as there over 100 000 observations and 235 factors.

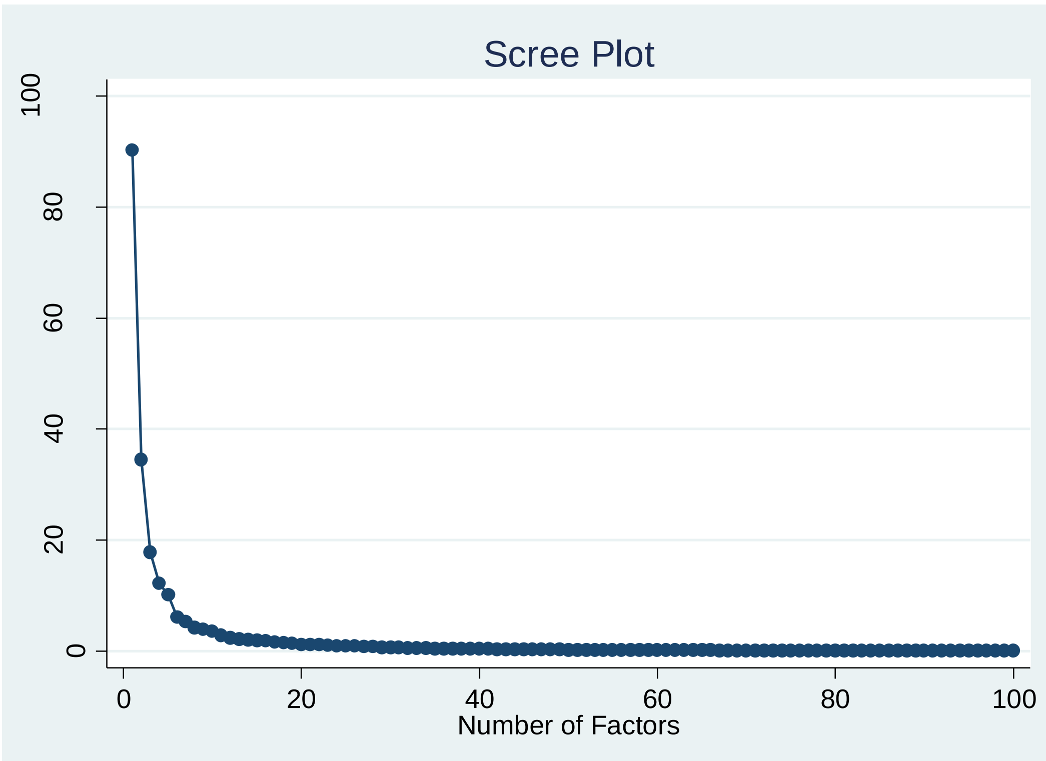
Many criteria can be used to determine the number of factors to retain. Keeping too few may result in losing valuable information and keeping too many may provide noisy estimates. Perhaps the most commonly used criterion is the Kaiser criterion, which states that components with eigenvalues greater than one should be retained. In samples with a large number of variables, this criterion causes retention of too many variables. As seen in Table 2, eigenvalues for the first twenty-two factors are greater than one. One may simply look at the proportion of variance explained by each factor and include only those factors which explain a relatively high proportion of common variance, usually at least 70-80%. From Table 2, it is observed that the first five factors explain 71.3% of the common variance, the first ten explain 81.3% and the first twenty-two explain 90.4%.

Table 2. Eigenvalues and accounted variance for first twenty-four factors

Factor	Eigenvalue	Difference	Proportion	Cumulative
F1	90.25568	55.70282	0.3905	0.3905
F2	34.55287	16.69993	0.1495	0.54
F3	17.85293	5.6817	0.0772	0.6172
F4	12.17124	2.08455	0.0527	0.6699
F5	10.08669	4.01127	0.0436	0.7135
F6	6.07542	0.8391	0.0263	0.7398
F7	5.23632	0.94706	0.0227	0.7625
F8	4.28926	0.36584	0.0186	0.781
F9	3.92342	0.41188	0.017	0.798
F10	3.51154	0.67108	0.0152	0.8132
F11	2.84046	0.41985	0.0123	0.8255
F12	2.42061	0.28555	0.0105	0.836
F13	2.13507	0.12007	0.0092	0.8452
F14	2.015	0.11394	0.0087	0.8539
F15	1.90106	0.09846	0.0082	0.8621
F16	1.8026	0.22448	0.0078	0.8699
F17	1.57813	0.07203	0.0068	0.8768
F18	1.5061	0.1754	0.0065	0.8833
F19	1.3307	0.18128	0.0058	0.889
F20	1.14942	0.03647	0.005	0.894
F21	1.11295	0.01719	0.0048	0.8988
F22	1.09576	0.10182	0.0047	0.9036
F23	0.99394	0.05433	0.0043	0.9079
F24	0.9396	0.02487	0.0041	0.9199

A scree plot graphs eigenvalues against factor numbers. There is a point at which the curve levels off, and all components to the left of that are considered meaningful and should be retained. Figure 1 shows somewhere between six and fifteen points to the left of the break in the curve. From these three criteria, twenty-two factors would capture most of the common variation in the data. The problem is that it might be difficult to label and interpret twenty separate factors. Instead ten factors are chosen, a reasonable number according to the Scree plot and cumulative common variance.

Figure 1. Scree plot for first 100 common factors



Rotations are applied to factor loadings so that they may be interpreted more simply. This is probably the most criticized aspect of CFA, that if the most convenient interpretation can be selected, it must not have much merit. However, rotations do not change the eigenvalues of the factors being rotated, nor do they affect the proportion of variance they account for. There are two types of rotations, orthogonal and oblique. Orthogonal rotations assume that common factors are uncorrelated with each other; this is sometimes considered to be a harsh assumption. For this paper orthogonal and oblique rotations are applied but the results from an oblique rotation are analyzed because it is assumed that at least a few of the ten factors are correlated with each other. Because the factors have been obliquely rotated, factor loadings from the pattern matrix do not represent correlations between factors and observed variables; these correlations are available in the structure matrix. Factors can be made by examining information from both matrices. Upon inspection of both matrices, there are several observed variables which load highly[10] onto multiple factors. These variables are not dropped but they are not considered when identifying and naming factors. Caution must be taken when analyzing factors because they may be directly and indirectly affect observed variables in unknown ways[11].

5.2 Interpreting Factors

Factor loadings of the ten factors can be seen in A2. Again, these factors represent skills that are required in occupations, not skills that individuals in these occupations necessarily possess. Factor 1 is highly correlated with deductive and inductive reasoning, originality, active learning and complex problem solving. This factor is referred to as critical thinking. Factor 2 is highly correlated with strength, flexibility, coordination and time spent in various active positions. As such, factor 2 is called physical skill. Factor 3 is associated with sales and marketing and dealing with unpleasant or angry people, and is called selling. Factor 4 is related to engineering, design and technology and so it is referred to as technical skill. Factor 5, caregiving, has high correlations with social skills, medicine and assisting others. Factor 6, associated with information sorting, perceptual speed, selective attention and degree of automation is attention to detail. Factor 7, while having moderately high factor loadings on staffing

[10] Have correlations greater than 0.5 in the structure matrix
[11] Fewer factors were extracted in the event that correlated factors could be merged together. Matrices with eight and nine factors still showed several variables which loaded onto multiple variables.

and personnel, is not highly correlated with them. It is assumed that factor 7 is weakly existent, and will be ignored in the next step of analysis. Factor 8 is highly correlated with company policy, supervision, and conventionalism so it is called compliance. Factor 9 is associated with fine arts, philosophy and history and archeology and is called artistic skill. Factor 10, alertness, is interesting in that it is correlated with far vision, night vision, transportation, geography, and operating vehicles. Factor levels for various occupations can be seen in Table 3, and they corroborate the interpretation and naming of common factors. Factor levels are measured as standard deviations from the mean. For example, physicians and surgeons require caregiving skills that are 2.78 standard deviations and attention to detail that is 1.48 standard deviations higher than the sample mean. Bus drivers require high levels of alertness, electricians need strong technical skills, and actors need strong artistic skills.

Table 3. Factor scores for various occupations

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
Physicians and surgeons	1.25	0.27	-0.99	0.99	2.78	1.48	-1.75	-2.76	-1.38	-0.15
Office clerks, general	-0.55	-0.75	0.32	-0.82	-0.10	1.10	-0.30	1.30	-0.13	-0.17
Electricians	-0.03	1.60	-0.24	2.46	-0.53	0.16	-0.66	-0.41	-0.25	-0.64
Bus drivers	-1.03	0.04	-0.79	0.28	0.34	-0.43	0.94	1.64	-0.52	4.19
Retail salespersons	-0.58	0.03	2.55	-0.40	0.03	0.17	-0.40	0.91	0.93	-0.44
Education administrators	1.62	-0.67	0.71	-0.35	0.48	0.33	0.50	0.22	1.22	0.32
Chief executives	2.16	-0.73	1.08	-1.13	-0.56	0.61	0.25	-0.14	0.31	0.50
Construction laborers	-1.17	1.78	-1.12	0.26	-1.11	-1.60	0.60	-0.38	-0.77	-1.00
Actors	-0.17	0.41	0.98	0.17	-0.14	-1.09	-1.21	-0.94	2.59	-0.17
Computer scientists and systems analysts	1.01	-1.03	-0.38	2.07	-0.16	1.79	-0.40	1.16	0.75	-0.09

5.2 Returns to Skills and Returns to Education

Two modified Mincer models are tested, one in which common factor skills are not included as independent variables, and one in which they are. Returns to education and skills are calculated for each year using (5.1) and (5.2). Separate regressions allow returns to education and returns to required skills (β_1, α_1, α_2, α_3, α_4, α_5, α_6, α_8, α_9, α_{10}) to change in different ways over time, but comparing returns across years means that different samples are also being compared.

$$\mathrm{logwage}_t = \beta_{0t} + \beta_{1t}\mathrm{educ}_t + \beta_{2t}\mathrm{exp}_t + \beta_{3t}\mathrm{exp}_t^2 + \beta_{4t}\mathrm{gender}_t + \beta_{5t}\mathrm{race}_t + u_t \quad (5.1)$$

$$\mathrm{logwage}_t = \beta_{0t} + \alpha_{1t}F_{1t} + \alpha_{2t}F_2 + \alpha_{3t}F_3 + \alpha_{4t}F_4 + \alpha_{5t}F_5 + \alpha_{6t}F_6 + \alpha_{8t}F_8 + \alpha_{9t}F_9 + \alpha_{10t}F_{10} + \beta_{1t}\mathrm{educ}_{tt} + \beta_{2t}\mathrm{exp}_t + \beta_{3t}\mathrm{exp}_t^2 + \beta_{4t}\mathrm{gender}_t + \beta_{5t}\mathrm{race}_t + u_t \quad (5.2)$$

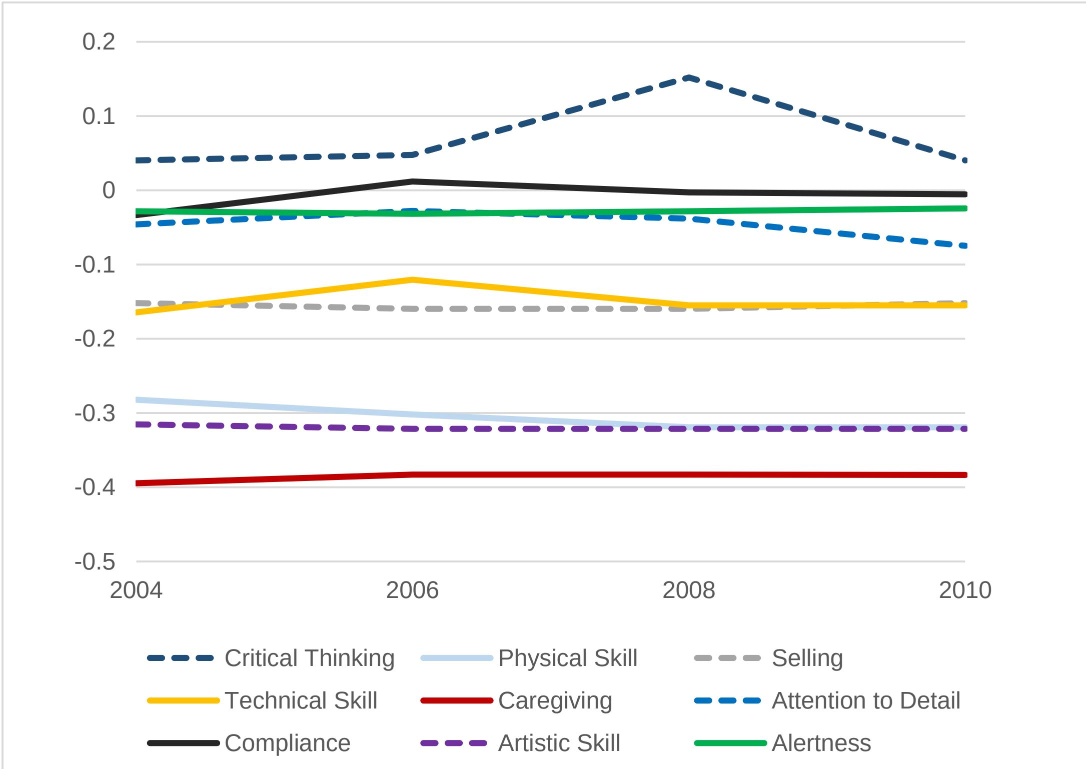
Pooled regressions (5.3 and 5.4) are also included to compare overall returns to year-specific ones.

$$\mathrm{logwage}_t = \beta_0 + \beta_1\mathrm{educ}_t + \beta_2\mathrm{exp}_t + \beta_3\mathrm{exp}_t^2 + \beta_4\mathrm{gender}_t + \beta_5\mathrm{race}_t + u_t \quad (5.3)$$

$$\mathrm{logwage}_t = \beta_0 + \alpha_1F_1 + \alpha_2F_2 + \alpha_3F_3 + \alpha_4F_4 + \alpha_5F_5 + \alpha_6F_6 + \alpha_8F_8 + \alpha_9F_9 + \alpha_{10}F_{10} + \beta_1\mathrm{educ}_t + \beta_2\mathrm{exp}_t + \beta_3\mathrm{exp}_t^2 + \beta_4\mathrm{gender}_t + \beta_5\mathrm{race}_t + u_t \quad (5.4)$$

Median levels of required skills remain relatively constant over time (Figure 2). There are short-lived increases in levels of critical thinking, compliance, and technical skill. Small decreases in median levels of required physical skills and attention to detail are also observed.

Figure 2. Median levels of factors from 2004 to 2010



Estimated coefficients for demographic variables suggest a large gender wage gap in favour of males and a smaller wage gap in favour of white workers (Table 4). AFQT and experience have a small positive impact on log wage throughout the time period. The squared experience term has a slightly negative impact on log wage. Returns to education increase over time from 1.7% in 2006 to 3.8% in 2010. Returns to education in this study are markedly lower than in previous literature. Whereas returns in this paper range from 1-4%, returns in OECD countries are usually 6-7% (Psacharopoulos 1994).

Table 4. Estimated regression coefficients from earnings equation excluding factors

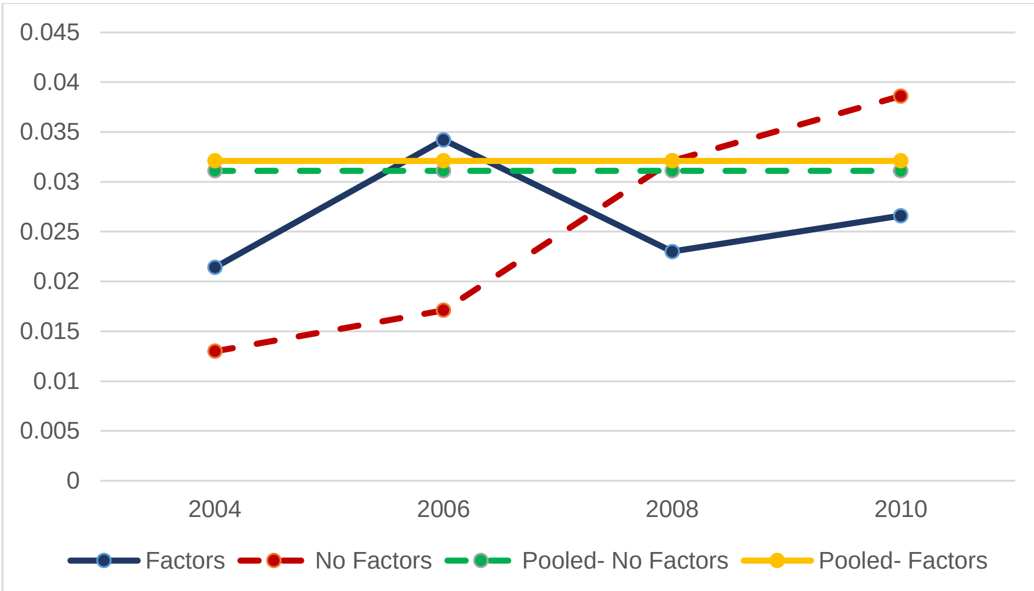
	2004	2006	2008	2010	Pooled Regression
Race	0.0052	0.0060	-0.0372*	-0.0224	-0.0118
	(0.0265)	(0.0270)	(0.0162)	(0.0161)	(0.0113)
Sex	-0.5990*	-0.6563*	-0.3427*	-0.3159*	-0.4970*
	(0.0414)	(0.0415)	(0.0242)	(0.0241)	(0.0171)
AFQT	0.0065*	0.0061*	0.0087*	0.0086*	0.0072*
	(0.0008)	(0.0008)	(0.0005)	(0.0004)	(0.0003)
Education	0.0130	0.0171*	0.0321*	0.0386*	0.0311*
	(0.0079)	(0.0085)	(0.0046)	(0.0044)	(0.0033)
Experience	0.0088	0.0118*	0.0276*	0.0242*	0.0209*
	(0.0070)	(0.0058)	(0.0052)	(0.0049)	(0.0028)
$Experience^2$	-0.0001	-0.0003*	-0.0006*	-0.0005*	-0.0003*
	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0001)
N	2866	2926	2885	2764	11441
F-stat	58.83[1]	64.39[1]	160.60[1]	166.19[1]	317.13[1]

*Estimate is significant at 0.05 level
[1]p-value is 0.0000

The return to education, without consideration of skill, increases steadily from 2004 to 2010 (Figure 3). When skills are included in the human-capital earnings equation, it is expected that returns to education will decrease, because some variation that was explained by years of schooling will be instead be attributed to a particular skill that is required on the job. This is observed in 2008 and 2010, but not in 2004 and 2006. In the former two years, returns to education increase when skills are considered. When comparing returns to education for pooled samples, the return with factors (3.21%) is only slightly higher than the return without factors (3.11%). In all four years and the pooled regression, returns to the nine skills are jointly significant[12]. This suggests that while skills are a meaningful addition to the human-capital earnings model, the relationship between working in an occupation that requires certain skills and having completed a certain number of years of schooling is not clear.

[12] See Table 5

Figure 3. Returns to education considering and not considering common factor skills



The estimated coefficients on the skill variables can be interpreted as "returns to skill", or the percent change relative to mean wage an individual can expect when he or she works in an occupation that requires skills that are one standard deviation above the mean. There are little significant returns to physical and technical skill over the observed time period (Table 5). Returns to alertness remain positive at around 3.6%. Returns to critical thinking jump from 8.6% to 22.5% between 2006 and 2008. Returns to caregiving, compliance and artistic skills are negative, and become dramatically less negative between 2006 and 2008. Returns to selling and attention to detail drop significantly during the same time period. It is possible that there is a labour market shock between 2006 and 2008 that partially accounts for the convergence of returns to skill to zero. It is possible that these big swings in returns stem from occupation or industry- specific changes. For example, jobs that require higher than average selling skills may offer lower wages because more people are seeking jobs in sales, or because there is less need for sales positions. Looking at the returns to skills in the pooled regression, the highest returns are to individuals who work in occupations that require critical thinking, selling and attention to detail. There are small positive returns to technical skills and alertness, no significant returns to physical skills and negative returns to caregiving, compliance and artistic skills.

Table 5. Estimated regression coefficients from earnings equations including factors

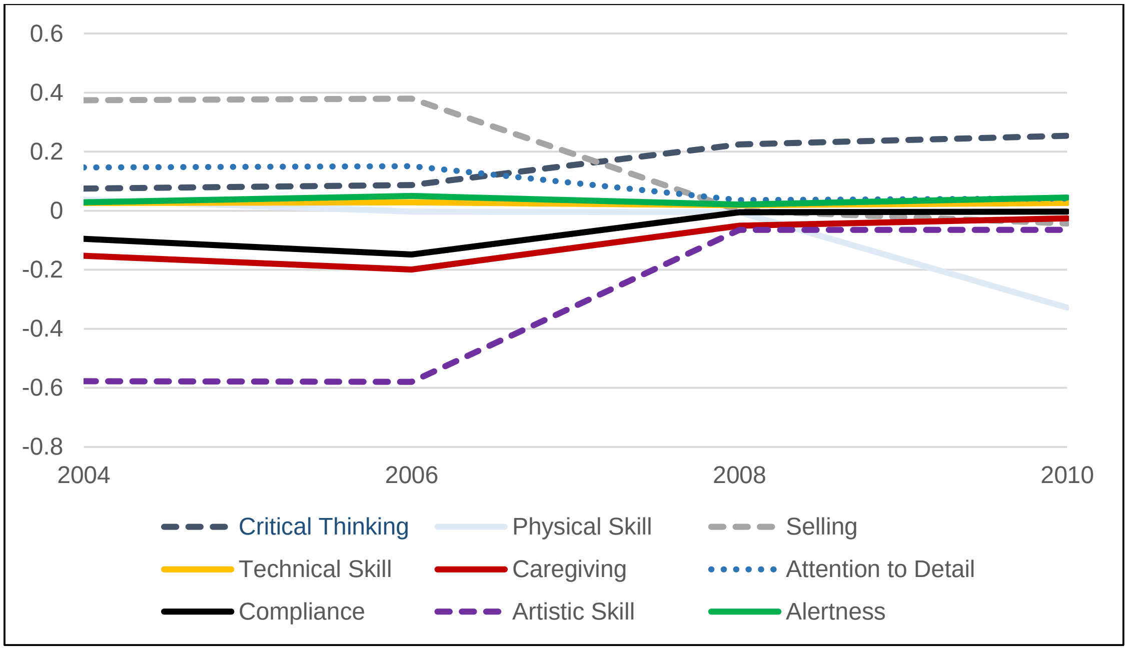
	2004	2006	2008	2010	Pooled Regression
Race	-0.0467*	-0.0501*	-0.0317*	-0.1365	-0.0295*
	(0.0214)	(0.0217)	(0.0153)	(0.0149)	(0.0102)
Sex	-0.3205*	-0.3240*	-0.2996*	-0.2996*	-0.3325*
	(0.0403)	(0.0411)	(0.0283)	(0.0274)	(0.0190)
AFQT	0.0061*	0.0054*	0.0060*	0.0054*	0.0054*
	(0.0007)	(0.0007)	(0.0005)	(0.0005)	(0.0003)
Critical Thinking	0.0747*	0.0865*	0.2247*	0.2539*	0.1621*
	(0.0214)	(0.0220)	(0.0153)	(0.0154)	(0.0103)
Physical Skills	0.0369	-0.0035	-0.0051	-0.0328*	0.0029
	(0.0226)	(0.0235)	(0.0161)	(0.0155)	(0.0108)
Selling	0.3742*	0.3788*	0.0002	-0.0429*	0.1783*
	(0.0222)	(0.0231)	(0.0159)	(0.0161)	(0.0108)
Technical Skills	0.0257	0.0287	0.0183	0.0265*	0.0246*
	(0.0175)	(0.0178)	(0.0128)	(0.0122)	(0.0083)
Caregiving	-0.1531*	-0.1998*	-0.0509*	-0.0256	-0.1015*
	(0.0192)	(0.0203)	(0.0139)	(0.0133)	(0.0093)
Attention to Detail	0.1469	0.1505*	0.0362*	0.0414*	0.0945*
	(0.0184)	(0.0184)	(0.0128)	(0.0126)	(0.0087)
Compliance	-0.0948*	-0.1486*	-0.0049	-0.0033	-0.0577*
	(0.0204)	(0.0217)	(0.0146)	(0.0137)	(0.0098)
Artistic Skills	-0.5775*	-0.5799*	-0.0650*	-0.0655*	-0.3143*
	(0.0179)	(0.0181)	(0.0123)	(0.0121)	(0.0084)
Alertness	0.0280*	0.0494*	0.0202	0.0448*	0.0327*
	(0.0164)	(0.0166)	(0.0118)	(0.0113)	(0.0078)
Education	0.0214*	0.0342*	0.0230*	0.0266*	0.0321*
	(0.0065)	(0.0069)	(0.0044)	(0.0042)	(0.0030)
Experience	0.0102	0.0169*	0.0225*	0.0177*	0.0202*
	(0.0057)	(0.0047)	(0.0049)	(0.0045)	(0.0025)
$Experience^2$	-0.0003*	-0.0004*	-0.0005*	-0.0004*	-0.0003*
	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
N	2866	2926	2885	2764	11441

F-stat	142.04[1]	150.42[1]	97.99[1]	109.72[1]	333.73[1]
Joint F-statistic[3]	175.91[1]	183.60[1]	42.39[1]	53.20[1]	306.90[1]

*Estimate is significant at 0.05 level
[1]p-value is 0.0000
[3]F-stat for testing joint significance of skills coefficients

The relationship between median skill levels and returns to skills is not consistent for all skills (Figure 4). As the median level of critical thinking increases in 2008, the return to critical thinking spikes, but when critical thinking decreases in 2010, the return increases again, albeit by a smaller amount. Technical skill increases in 2006 and decreases afterwards, but technical skills remain small and insignificant. It is possible that there is a lag between return to skill and median skill level. A decrease in returns to attention to detail in 2006 is followed by a decrease in its median level in 2008. However the opposite is seen for physical skill; a decrease in its median level is followed by a decrease in returns to physical skill. With only data for alternating years of a short time frame, it is difficult to determine the nature of the relationship between median levels of skill and returns to skill.

Figure 4. Returns to skills from 2004 to 2010



Trends in returns to skills and education somewhat overlap with Ingram and Neumann's results, however there are several key differences. More detailed occupational information in recent years has allowed for more specific skills to be identified. Whereas Ingram and Neumann (2006) identifies a broad skill labeled intelligence, this paper identifies many skills which represent types of intelligence. Critical thinking can be thought of as traditional problem solving, technical skill as the application of knowledge, and caregiving involving emotional intelligence. Imai et al. (2014) group their five skills into their cognitive or manual types. Skills identified with this data are more difficult to group, because they are so diverse. In Ingram and Neumann (2006), returns to intelligence, coordination and physical strength increase while returns to fine motor skills drop. Over thirty years, most of the annual returns to these skills are positive. In this case, returns to many skills drop and many of the returns are negative. Because these skills required in occupations, perhaps this says something about the value of skills in terms of how highly demanded they are.

6. Conclusions

Through factor analysis of occupational characteristics, nine underlying skills required by occupations are identified. These nine skills are able to account for changes in log wages which years of schooling, and standardized measures of ability (AFQT scores) cannot. Accounting for skills results in higher returns to education in the first half of the period and lower returns in the second half. Trends in median levels and returns to skills vary based on the specific skill. Interactions between skills, and between skills and education are not clear so there is little straight forward interpretation. This once again encourages the pursuit of more research on alternative measures of skills, and especially the relationship between skills and education.

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Appendix

A1. All occupation characteristics from O*NET 2002

	Ability	
A1. Oral Comprehension	A18. Spatial Orientation	A36. Stamina
A2. Written Comprehension	A19. Visualization	A37. Extent Flexibility
A3. Oral Expression	A20. Selective Attention	A38. Dynamic Flexibility
A4. Written Expression	A21. Time Sharing	A39. Gross Body Coordination
A5. Fluency of Ideas	A22. Arm-Hand Steadiness	A40. Gross Body Equilibrium
A6. Originality	A23. Manual Dexterity	A41. Near Vision
A7. Problem Sensitivity	A24. Finger Dexterity	A42. Far Vision
A8. Deductive Reasoning	A25. Control Precision	A43. Visual Color Discrimination
A9. Inductive Reasoning	A26. Multilimb Coordination	A44. Night Vision
A10. Information Ordering	A27. Response Orientation	A45. Peripheral Vision
A11. Category Flexibility	A28. Rate Control	A46. Depth Perception
A12. Mathematical Reasoning	A29. Reaction Time	A47. Glare Sensitivity
A13. Number Facility	A30. Wrist-Finger Speed	A48. Hearing Sensitivity
A14. Memorization	A31. Speed of Limb Movement	A49. Auditory Attention
A15. Speed of Closure	A32. Static Strength	A50. Sound Localization
A16. Flexibility of Closure	A33. Explosive Strength	A51. Speech Recognition
A17. Perceptual Speed	A34. Dynamic Strength	A52. Speech Clarity
	A35. Trunk Strength	

Skills

S1. Reading Comprehension
S2. Active Listening
S3. Writing
S4. Speaking
S5. Mathematics
S6. Science
S7. Critical Thinking
S8. Active Learning
S9. Learning Strategies
S10. Monitoring
S11. Social Perceptiveness
S12. Coordination
S13. Troubleshooting
S14. Persuasion
S15. Negotiation
S16. Instructing
S17. Service Orientation
S18. Operations Analysis
S19. Technology Design
S20. Equipment Selection
S21. Installation
S22. Programming
S23. Operation Monitoring
S24. Operation and Control
S25. Equipment Maintenance
S26. Repairing
S27. Judgment and Decision
S28. Making
S29. Time Management
S30. Management of Financial Resources
S31. Management of Material Resources
S32. Management of Personnel Resources
S33. Quality Control Analysis
S34. Complex Problem Solving
S35. Systems Analysis
S36. Systems Evaluation

Knowledge

K1. Administration and Management
K2. Clerical
K3. Economics and Accounting
K4. Sales and Marketing
K5. Customer and Personal Service
K6. Personnel and Human Resources
K7. Production and Processing
K8. Food Production
K9. Computers and Electronics
K10. Engineering and Technology
K11. Design
K12. Building and Construction
K13. Mechanical
K14. Mathematics
K15. Physics
K16. Chemistry
K17. Biology
K18. Psychology
K19. Sociology and Anthropology
K20. Geography
K21. Medicine and Dentistry
K22. Therapy and Counseling
K23. Education and Training
K24. English Language
K25. Foreign Language
K26. Fine Arts
K27. History and Archeology
K28. Philosophy and Theology
K29. Public Safety and Security
K30. Law and Government
K31. Telecommunications
K32. Communications and Media
K33. Transportation

Interest

I1. Realistic
I2. Investigative
I3. Artistic
I4. Social
I5. Enterprising
I6. Conventional
I7. First Interest High-Point
I8. Second Interest High-Point
I9. Third Interest High-Point

Work Value	
V1. Achievement-Mean Extent	V15. Creativity
V2. Working Conditions-Mean Extent	V16. Independence
V3. Recognition-Mean Extent	V17. Moral Values
V4. Relationships-Mean Extent	V18. Recognition
V5. Support-Mean Extent	V19. Responsibility
V6. Independence-Mean Extent	V20. Security
V7. Ability Utilization	V21. Social Service
V8. Achievement	V22. Social Status
V9. Activity	V23. Supervision, Human Relations
V10. Advancement	V24. Supervision, Technical
V11. Authority	V25. Variety
V12. Company Policies and Practices	V26. Working Conditions
V13. Compensation	V27. Autonomy
V14. Co-workers	

Work Activity	
W1. Getting Information	W20. Parts, and Equipment
W2. Identifying Objects, Actions, and Events	W21. Repairing and Maintaining Mechanical
W3. Monitor Processes, Materials, or Surroundings	W22. Equipment
W4. Inspecting Equipment, Structures, or Material	W23. Repairing and Maintaining Electronic Equipment
W5. Estimating the Quantifiable Characteristics of Products, Events, or Information	W24. Documenting/Recording Information
W6. Judging the Qualities of Things, Services, or People	W25. Interpreting the Meaning of Information for Others
W7. Evaluating Information to Determine Compliance with Standards	W26. Communicating with Supervisors, Peers, or Subordinates
W8. Processing Information	W27. Communicating with Persons Outside
W9. Analyzing Data or Information	W28. Organization
W10. Making Decisions and Solving Problems	W29. Establishing and Maintaining Interpersonal
W11. Thinking Creatively	W30. Relationships
W12. Updating and Using Relevant Knowledge	W31. Assisting and Caring for Others
W13. Developing Objectives and Strategies	W32. Selling or Influencing Others
W14. Scheduling Work and Activities	W33. Resolving Conflicts and Negotiating with Others
W15. Performing General Physical Activities	W34. Performing for or Working Directly with the Public
W16. Handling and Moving Objects	W35. Coordinating the Work and Activities of Others
W17. Controlling Machines and Processes Interacting With Computers	W36. Developing and Building Teams
W18. Operating Vehicles, Mechanized Devices, or Equipment	W37. Training and Teaching Others
W19. Drafting, Laying Out, and Specifying Technical Devices,	W38. Guiding, Directing, and Motivating Subordinates
	W39. Coaching and Developing Others
	W40. Provide Consultation and Advice to Others
	W41. Performing Administrative Activities
	W42. Staffing Organizational Units
	W43. Monitoring and Controlling Resources

Work Context

C1. Contact With Others
C2. Deal With External Customers
C3. Coordinate or Lead Others
C4. Responsible for Others' Health and Safety
C5. Responsibility for Outcomes and Results
C6. Frequency of Conflict Situations
C7. Deal With Unpleasant or Angry People
C8. Deal With Physically Aggressive People
C9. Indoors, Environmentally Controlled
C10. Outdoors, Exposed to Weather
C11. Sounds, Noise Levels Are Distracting or Uncomfortable
C12. Very Hot or Cold Temperatures
C13. Extremely Bright or Inadequate Lighting
C14. Exposed to Contaminants
C15. Cramped Work Space, Awkward Positions
C16. Exposed to Whole Body Vibration
C17. Exposed to Radiation
C18. Exposed to Disease or Infections
C19. Exposed to High Places
C20. Exposed to Hazardous Conditions
C21. Exposed to Hazardous Equipment
C22. Exposed to Minor Burns, Cuts, Bites, or Stings
C23. Spend Time Sitting
C24. Spend Time Standing
C25. Spend Time Climbing Ladders, Scaffolds, or Poles
C26. Spend Time Walking and Running
C27. Spend Time Kneeling, Crouching, Stooping, or Crawling?
C28. Spend Time Keeping or Regaining Balance
C29. Spend Time Using Your Hands to Handle, Control, or Feel Objects, Tools, or Controls
C30. Spend Time Bending or Twisting the Body
C31. Spend Time Making Repetitive Motions
C32. Wear Common Protective or Safety Equipment such as Safety Shoes, Glasses, Gloves, Hearing Protection, Hard Hats, or Life Jackets
C33. Wear Specialized Protective or Safety Equipment such as Breathing Apparatus, Safety Harness, Full Protection Suits, or Radiation Protection
C34. Consequence of Error
C35. Degree of Automation
C36. Importance of Being Exact or Accurate
C37. Importance of Repeating Same Tasks
C38. Pace Determined by Speed of Equipment

A2. Factor loadings for of common factors onto occupational characteristics

Variable	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
Arm Hand Steadiness	-0.24	0.46	0.11	0.26	0.19	0.43	0.05	-0.15	-0.05	-0.20
Auditory Attention	0.17	0.16	0.22	0.07	0.22	0.36	0.16	0.17	0.17	0.32
Category Flexibility	0.49	0.21	-0.01	-0.14	-0.26	0.78	0.08	-0.03	0.28	-0.13
Control Precision	-0.21	0.34	-0.15	0.38	-0.04	0.26	0.01	-0.05	-0.15	0.19
Deductive Reasoning	0.87	0.01	0.08	0.17	-0.14	0.25	-0.02	-0.10	-0.04	0.02
Depth Perception	-0.07	0.75	-0.04	0.12	-0.07	0.09	-0.12	0.06	0.05	0.41
Dynamic Flexibility	-0.22	0.82	0.03	-0.03	-0.02	0.15	0.06	0.03	0.11	-0.03
Dynamic Strength	-0.11	0.87	-0.09	-0.06	-0.06	-0.02	0.01	-0.02	0.04	0.05
Explosive Strength	-0.06	0.87	-0.07	0.03	-0.04	0.00	-0.02	0.03	0.03	0.19
Extent Flexibility	-0.28	0.78	0.14	0.06	-0.01	0.28	0.04	0.01	0.05	0.05
Far Vision	0.27	0.62	0.02	0.00	0.03	0.02	-0.01	0.12	0.26	0.52
Finger Dexterity	-0.34	0.14	-0.01	0.31	0.03	0.62	0.03	-0.05	0.00	-0.19
Flexibility of Closure	0.50	0.33	-0.11	0.13	-0.12	0.48	-0.08	-0.10	0.13	0.23
Fluency of Ideas	0.85	-0.01	0.13	0.13	-0.02	0.11	0.08	-0.06	0.21	-0.06
Glare Sensitivity	0.01	0.61	-0.03	-0.01	-0.04	0.08	-0.20	0.11	-0.08	0.61

Body Coordination	-0.07	0.93	-0.02	-0.04	0.08	-0.02	-0.07	0.13	0.09	0.19
Body Equilibrium	-0.02	1.02	0.09	-0.08	-0.01	0.13	-0.12	0.13	0.10	0.04
Hearing Sensitivity	-0.06	0.19	0.01	0.30	0.15	0.32	0.23	-0.03	0.08	0.44
Inductive Reasoning	0.81	0.04	0.09	0.14	-0.02	0.32	-0.03	-0.15	-0.03	0.06
Information Ordering	0.45	0.32	0.03	0.09	-0.09	0.73	0.06	-0.02	-0.09	-0.10
Manual Dexterity	-0.31	0.55	0.00	0.16	0.02	0.40	0.08	-0.10	-0.01	-0.14
Math. Reasoning	0.60	-0.11	0.19	0.07	-0.20	0.44	-0.01	0.01	-0.01	-0.04
Memorization	0.31	0.20	0.26	-0.11	0.04	0.65	0.05	-0.02	0.28	0.08
Multilimb Coordination	-0.22	0.74	-0.08	0.09	0.07	0.13	-0.01	-0.01	0.01	0.15
Near Vision	0.30	0.04	-0.06	0.00	-0.13	0.77	-0.14	0.08	0.07	0.06
Night Vision	-0.04	0.50	0.15	-0.01	0.16	0.19	-0.06	-0.03	0.04	0.56
Number Facility	0.47	-0.06	0.31	0.00	-0.18	0.48	-0.02	0.06	-0.08	-0.06
Oral Comprehension	0.61	-0.07	0.24	-0.02	0.27	0.14	-0.02	0.10	0.02	0.05
Oral Expression	0.54	-0.10	0.33	0.03	0.31	0.09	0.00	0.10	0.01	0.10
Originality	0.83	0.02	0.11	0.14	-0.11	0.14	0.16	-0.07	0.31	-0.07
Perceptual Speed	0.11	0.17	0.02	-0.05	-0.15	0.87	0.01	0.09	-0.05	0.05
Peripheral Vision	-0.11	0.60	0.11	-0.04	0.15	0.24	0.08	0.06	0.22	0.44
Problem Sensitivity	0.83	0.14	0.01	0.16	0.19	0.14	0.06	-0.10	-0.11	0.11
Rate Control	-0.12	0.48	-0.07	0.17	0.02	-0.01	0.08	0.02	-0.09	0.57
Reaction Time	-0.25	0.41	0.03	0.16	0.28	0.20	0.07	-0.03	-0.15	0.49
Response Orientation	-0.19	0.42	0.12	0.11	0.23	0.30	0.10	0.12	-0.12	0.52
Selective Attention	0.29	0.15	0.15	0.10	0.17	0.55	0.05	0.11	-0.04	0.27
Sound Localization	-0.06	0.27	0.03	0.23	0.26	0.22	0.22	0.08	0.10	0.49
Spatial Orientation	-0.04	0.75	0.30	0.00	0.01	0.13	-0.04	0.06	0.00	0.41
Speech Clarity	0.53	-0.06	0.26	-0.08	0.20	0.20	0.00	0.07	0.14	0.15
Speech Recognition	0.28	0.07	0.32	-0.20	0.18	0.41	-0.01	0.10	0.17	0.16
Speed of Closure	0.60	0.03	-0.05	0.09	-0.02	0.55	-0.07	-0.06	0.06	0.08
Limb Speed	-0.19	0.78	-0.04	-0.04	0.07	0.18	0.08	0.03	0.01	0.07
Stamina	-0.11	0.91	0.00	-0.19	0.06	-0.07	0.03	-0.02	0.11	0.10
Static Strength	-0.27	0.76	0.05	-0.06	0.09	0.06	0.07	-0.05	-0.01	0.13
Time Sharing	0.48	0.17	0.06	0.01	0.39	0.14	0.26	0.24	0.07	0.25
Trunk Strength	-0.15	0.81	0.01	-0.14	-0.06	0.28	0.12	-0.01	0.16	0.05
Color Discrimination	-0.23	0.35	0.35	0.33	0.09	0.52	0.00	-0.21	0.21	-0.05
Visualization	0.27	0.50	0.17	0.50	-0.26	0.28	-0.05	-0.04	0.24	-0.12
Wrist Finger Speed	-0.43	0.10	-0.21	-0.05	-0.02	0.72	0.02	0.12	0.05	-0.21
Written Comp.	0.72	-0.16	-0.03	0.03	0.04	0.25	-0.13	0.08	0.06	0.01
Written Expression	0.67	-0.17	0.07	-0.07	0.05	0.28	-0.07	0.03	0.07	0.06
Artistic	0.25	-0.03	0.02	0.09	0.42	-0.16	-0.09	-0.03	0.49	-0.19
Conventional	0.18	-0.31	-0.02	-0.31	-0.20	0.39	0.04	0.33	-0.27	-0.06
Enterprising	0.47	0.00	0.61	-0.21	-0.08	-0.07	0.16	0.08	-0.27	0.01
First Interest	0.13	-0.20	0.24	-0.40	0.18	0.16	-0.06	0.31	-0.17	-0.07

Investigative	0.45	-0.22	-0.15	0.39	0.30	0.09	-0.33	-0.12	0.04	-0.11
Realistic	-0.23	0.44	-0.13	0.38	-0.08	-0.08	0.06	-0.01	-0.08	0.01
Second Interest	0.10	-0.23	0.09	-0.16	-0.29	0.06	0.30	0.07	-0.01	0.06
Social	0.19	-0.08	0.11	-0.18	0.73	-0.20	0.02	0.06	0.17	0.03
Third Interest	0.36	-0.18	0.07	0.15	-0.05	-0.06	0.27	0.04	-0.04	0.12
Admin. & Management	1.02	-0.08	0.02	-0.11	-0.04	-0.08	0.29	-0.01	-0.12	-0.05
Biology	0.18	0.11	-0.12	-0.02	0.69	0.10	-0.08	-0.44	-0.03	-0.09
Building & Construc.	0.38	0.75	-0.04	-0.01	-0.35	-0.15	-0.22	0.01	0.00	-0.16
Chemistry	0.05	0.26	-0.11	0.08	0.47	0.12	-0.01	-0.45	0.00	-0.04
Clerical	-0.01	-0.30	-0.11	-0.32	0.11	0.46	-0.12	0.33	-0.10	0.00
Comm. & Media	0.55	-0.09	0.22	-0.07	-0.05	0.19	-0.03	0.02	0.19	0.12
Computers & Elec.	0.12	-0.41	0.00	0.35	-0.05	0.44	-0.27	0.21	0.00	0.01
Customer Service	-0.09	-0.09	0.55	-0.06	0.54	0.10	0.26	0.01	0.01	-0.03
Design	0.19	0.20	0.16	0.71	-0.24	0.01	-0.20	0.09	0.08	-0.14
Econ. & Accounting	0.58	-0.14	0.32	-0.29	-0.31	0.21	0.11	-0.01	-0.24	-0.02
Educ. & Training	0.78	-0.09	-0.10	0.05	0.26	-0.09	0.20	0.04	0.31	-0.03
Engineering	0.27	0.33	0.03	0.65	-0.22	0.04	-0.12	-0.01	-0.08	0.07
English	0.59	-0.11	-0.04	-0.17	0.14	0.25	-0.16	0.05	0.23	0.05
Fine Arts	0.02	0.20	0.08	0.02	-0.01	-0.02	-0.11	0.01	0.70	-0.15
Food Productive	0.21	-0.01	0.07	-0.08	-0.02	0.06	0.43	-0.42	0.04	-0.05
Foreign Language	0.43	0.16	-0.02	-0.32	0.01	0.24	0.06	-0.11	0.46	0.11
Geography	0.26	0.16	0.09	-0.17	-0.14	-0.08	-0.14	0.04	0.33	0.57
History & Archeology	0.38	0.03	-0.33	-0.16	-0.01	0.16	-0.05	0.00	0.77	0.07
Law & Government	0.64	0.10	0.06	-0.41	-0.14	0.24	-0.03	-0.14	-0.05	0.29
Mathematics	0.60	-0.12	0.24	0.08	-0.19	0.26	-0.04	0.07	-0.10	-0.10
Mechanical	-0.01	0.40	-0.08	0.50	-0.24	0.05	0.12	-0.04	-0.06	0.20
Medicine & Dentistry	0.07	0.10	-0.06	0.01	0.89	0.03	-0.17	-0.22	-0.21	-0.04
Personnel	0.95	-0.04	0.11	-0.12	-0.08	-0.06	0.50	-0.02	-0.25	-0.07
Philosophy & Theology	0.34	0.03	-0.20	-0.21	0.09	0.13	-0.06	-0.11	0.65	0.08
Physics	0.22	0.46	-0.15	0.50	0.00	-0.05	-0.18	-0.02	0.09	0.07
Produc. & Processing	0.46	0.16	0.08	0.19	-0.45	0.10	0.40	-0.06	-0.11	-0.08
Psychology	0.58	-0.02	0.09	-0.13	0.48	-0.02	0.14	-0.04	0.12	0.08
Public Safety	0.46	0.41	0.03	0.01	0.16	0.07	0.08	-0.02	-0.10	0.43
Sales & Marketing	0.23	-0.04	0.84	0.00	-0.18	-0.02	0.15	-0.11	-0.08	0.01
Sociology & Anthro.	0.57	0.07	-0.06	-0.26	0.20	0.01	0.00	-0.07	0.47	0.15
Telecommunications	0.12	-0.16	0.18	0.14	-0.01	0.13	-0.21	0.25	-0.06	0.42
Therapy & Counsel.	0.33	0.01	-0.22	-0.11	0.70	-0.07	-0.09	-0.15	0.18	0.04
Transportation	0.08	0.27	0.14	-0.07	-0.15	-0.17	0.01	0.06	-0.10	0.73
Active Learning	0.89	-0.13	-0.15	0.10	0.06	0.02	-0.11	-0.08	0.04	-0.05
Active Listening	0.53	-0.14	0.17	-0.11	0.35	0.03	-0.16	0.12	-0.01	0.00
Problem Solving	0.93	-0.09	-0.14	0.02	-0.01	0.03	-0.10	0.00	0.03	-0.02

Coordination	1.00	0.11	-0.10	-0.14	0.12	-0.09	0.19	0.09	-0.07	-0.02
Critical Thinking	0.90	-0.09	-0.04	0.09	0.10	-0.03	-0.09	-0.05	-0.09	0.01
Equip. Maintenance	-0.08	0.29	-0.12	0.55	-0.15	-0.11	0.18	0.00	-0.10	0.27
Equip. Selection	0.42	0.29	-0.33	0.56	0.01	-0.03	-0.02	-0.01	0.05	-0.11
Installation	0.08	0.27	-0.08	0.65	-0.22	0.01	-0.02	0.02	0.01	0.01
Instructing	0.71	-0.11	-0.12	0.19	0.43	-0.24	0.08	0.09	0.17	-0.07
Decision Making	0.95	-0.01	-0.05	-0.04	0.05	-0.04	-0.07	-0.08	-0.12	0.05
Learning Strategies	0.81	-0.12	-0.33	0.07	0.31	-0.17	0.05	0.08	0.27	-0.10
Managing Finance	0.86	-0.08	0.15	-0.24	-0.25	0.03	0.19	-0.10	-0.19	-0.02
Managing Material	0.94	0.07	0.12	0.15	-0.06	-0.04	0.34	0.03	-0.16	-0.07
Managing Personnel	1.06	0.00	-0.07	-0.05	-0.02	-0.04	0.41	0.00	-0.06	-0.08
Mathematics	0.53	-0.16	0.12	0.15	-0.13	0.22	-0.20	0.06	-0.12	-0.20
Monitoring	0.94	-0.04	-0.24	-0.10	0.11	0.06	0.03	0.00	0.06	-0.05
Negotiation	0.84	-0.02	0.19	-0.13	-0.06	-0.18	0.05	-0.05	-0.07	0.10
Operation & Control	-0.03	0.14	-0.40	0.44	-0.04	0.10	0.11	0.07	-0.15	0.25
Operation Monitoring	-0.09	-0.06	-0.18	0.74	0.09	0.04	0.15	0.02	-0.28	0.26
Operation Analysis	0.84	-0.05	-0.09	0.38	-0.18	0.01	0.03	0.03	0.10	-0.13
Persuasion	0.68	-0.01	0.25	-0.08	0.10	-0.19	-0.14	-0.07	0.00	0.13
Programming	0.17	-0.33	-0.12	0.51	-0.08	0.22	-0.14	0.12	0.13	-0.05
Quality Control	0.34	-0.02	-0.20	0.74	-0.13	0.19	-0.01	0.05	-0.07	-0.06
Reading Comprehension	0.71	-0.25	-0.18	0.00	0.16	0.14	-0.21	0.05	0.00	0.00
Repairing	-0.10	0.28	-0.08	0.58	-0.21	-0.07	0.08	0.00	-0.02	0.21
Science	0.29	-0.05	-0.19	0.60	0.34	0.04	-0.22	-0.23	-0.04	-0.06
Service Orientation	-0.04	-0.08	0.43	-0.08	0.68	-0.02	0.01	0.02	0.06	0.02
Social Perceptiveness	0.48	-0.10	0.22	-0.14	0.51	-0.12	0.08	0.04	0.08	0.07
Speaking	0.64	-0.10	0.17	-0.05	0.31	-0.03	-0.10	0.09	0.04	0.07
System Analysis	1.03	0.00	-0.07	-0.03	-0.10	-0.03	0.05	-0.07	-0.06	-0.01
System Evaluation	1.02	-0.01	-0.05	-0.02	-0.07	-0.05	0.05	-0.06	-0.11	0.00
Technology Design	0.09	0.02	0.03	0.88	0.13	-0.02	-0.19	0.10	0.00	-0.05
Time Management	0.97	-0.03	-0.18	-0.09	0.10	-0.14	0.19	0.06	0.01	0.03
Troubleshooting	0.06	0.07	-0.01	0.85	-0.12	-0.01	0.07	0.09	-0.14	0.22
Writing	0.69	-0.22	-0.05	-0.13	0.10	0.15	-0.12	0.04	0.00	0.07
Analyzing Data	0.82	-0.08	0.02	0.01	-0.06	0.25	-0.10	-0.08	0.02	-0.01
Assisting Others	0.00	-0.05	0.10	-0.02	0.94	-0.20	-0.10	-0.01	-0.03	0.01
Coaching	0.91	-0.02	-0.08	-0.02	0.17	-0.03	0.37	0.03	0.19	-0.03
Comm. Outside	0.37	-0.15	0.45	-0.14	0.21	0.09	-0.11	-0.08	0.06	0.10
Comm. Supervisors	0.85	-0.07	-0.01	-0.09	0.08	0.15	0.11	0.06	-0.06	0.01
Controlling Machines	-0.40	0.30	0.02	0.32	0.09	0.18	0.13	-0.04	-0.16	-0.14
Coordinating Work	0.99	0.04	0.07	-0.05	-0.01	0.06	0.39	-0.01	-0.05	-0.05
Developing Teams	1.00	0.06	-0.06	-0.12	-0.03	0.10	0.38	-0.05	0.17	-0.01
Developing Objectives	1.01	0.01	-0.08	-0.15	-0.10	0.04	0.14	-0.15	0.17	0.00

Documenting Info.	0.44	-0.24	0.12	-0.09	0.18	0.35	-0.08	0.08	-0.16	0.11
Drafting	0.26	0.12	0.20	0.77	-0.10	0.03	-0.13	-0.01	0.03	-0.15
Establish. Quantifiable	0.44	-0.10	0.35	-0.13	0.36	0.12	0.12	0.00	0.07	0.07
Estimate. Quantifiable	0.91	0.14	0.12	0.07	-0.19	0.13	0.14	-0.19	-0.03	0.02
Evaluating Information	0.78	-0.06	-0.14	-0.07	-0.06	0.38	-0.06	-0.03	-0.04	0.02
Getting Information	0.85	-0.03	-0.09	0.00	-0.03	0.19	-0.17	-0.04	0.07	0.01
Guiding	1.05	0.01	-0.07	-0.07	-0.07	0.02	0.46	-0.02	0.02	-0.10
Moving Objects	-0.47	0.46	-0.07	0.14	0.12	0.14	0.12	0.07	0.02	-0.18
Identifying Objects	0.77	-0.07	0.02	0.04	0.07	0.27	-0.07	-0.12	-0.08	0.00
Inspecting Equipment	0.16	0.26	0.08	0.76	0.01	-0.09	0.14	0.06	-0.20	0.12
Using Computers	0.36	-0.35	0.03	0.13	-0.04	0.50	-0.11	0.15	0.02	-0.06
Interpreting Info.	0.66	-0.10	0.03	-0.05	0.14	0.19	-0.17	-0.05	0.13	0.09
Judging Qualities	0.83	0.02	-0.13	-0.04	0.03	0.23	-0.04	-0.18	0.18	0.02
Decision Making	0.95	-0.04	0.00	0.03	0.00	0.08	0.02	-0.12	-0.04	0.04
Monitor Processes	0.76	0.11	-0.04	0.28	0.30	0.13	0.20	-0.15	-0.15	0.04
Monitoring Resources	0.78	-0.01	0.25	-0.21	-0.14	0.21	0.43	-0.11	-0.08	0.00
Operating Vehicles	-0.13	0.35	0.06	0.12	-0.19	-0.26	-0.03	-0.07	-0.09	0.75
Organizing	0.97	0.00	-0.05	-0.09	-0.03	0.05	0.15	-0.07	0.15	0.02
Working with Public	0.70	-0.15	0.07	-0.28	-0.07	0.35	0.23	0.05	-0.09	0.06
Administrative Work	-0.10	-0.11	0.62	-0.15	0.43	0.04	-0.03	-0.02	0.03	0.12
Physical Work	-0.17	0.78	0.03	-0.02	0.25	-0.14	0.08	-0.07	0.00	0.01
Processing Info.	0.62	-0.22	0.00	-0.12	-0.08	0.40	-0.11	0.03	-0.01	0.00
Consulting	0.81	-0.04	0.11	0.03	-0.01	0.16	-0.06	-0.12	0.14	0.00
Repairing Electronics	-0.16	-0.05	0.09	0.77	0.03	0.15	-0.05	0.07	-0.02	0.11
Repair. Mech. Equip.	-0.15	0.23	-0.06	0.51	-0.20	-0.02	0.15	-0.03	-0.04	0.32
Resolving Conflict	0.68	-0.02	0.28	-0.21	0.07	0.08	0.26	0.02	0.00	0.14
Scheduling	0.85	-0.12	0.08	-0.06	0.09	0.01	0.38	0.06	-0.04	-0.07
Selling	0.40	0.00	0.68	-0.09	0.00	-0.02	0.01	-0.18	0.04	0.07
Staffing	0.93	-0.02	0.10	-0.13	-0.13	-0.01	0.57	-0.05	-0.15	-0.08
Thinking Creatively	0.74	-0.06	0.04	0.19	-0.04	0.11	0.07	-0.11	0.43	-0.09
Training	0.76	-0.10	-0.10	0.07	0.30	-0.06	0.20	0.01	0.26	-0.03
Using Knowledge	0.69	-0.11	0.09	0.25	0.14	0.20	-0.16	-0.15	0.03	-0.01
Error Consequence	0.72	0.25	-0.04	0.02	0.12	0.12	-0.12	-0.08	-0.47	0.19
Contact with Others	0.19	-0.06	0.45	-0.08	0.61	-0.09	0.06	0.15	-0.01	0.03
Coordinate & Lead	1.02	0.02	-0.05	0.01	0.05	-0.16	0.34	0.11	-0.02	-0.07
Cramped Work Space	-0.04	0.80	-0.06	0.18	-0.08	-0.03	-0.15	0.05	-0.05	0.00
External Customers	-0.17	-0.08	0.79	-0.10	0.46	0.07	-0.08	-0.03	-0.23	0.08
Dealing w. Aggressive	0.11	0.13	-0.07	-0.09	0.65	-0.18	-0.10	0.11	0.07	0.28
Dealing w. Angry	0.05	-0.07	0.42	-0.14	0.58	0.00	0.03	0.15	-0.07	0.15
Degree of Automation	0.13	-0.08	-0.11	0.22	-0.23	0.70	0.16	0.16	-0.04	0.13
Contaminant Exposure	0.02	0.77	-0.09	0.02	-0.10	0.08	0.05	-0.16	-0.04	-0.02

Disease Exposure	-0.01	0.08	-0.09	-0.05	0.84	0.06	-0.12	-0.30	-0.19	-0.09
Hazardous Conditions	0.10	0.67	-0.07	0.23	-0.06	0.01	-0.05	-0.11	-0.09	0.01
Hazardous Equipment	0.00	0.57	-0.14	0.28	-0.18	-0.03	0.08	-0.01	-0.11	0.05
High Places	0.17	0.97	-0.08	-0.12	-0.05	-0.12	-0.29	0.18	-0.07	-0.10
Minor Burns & Cuts	-0.03	0.68	-0.10	0.02	0.03	0.06	0.18	-0.16	0.01	-0.10
Radiation	0.07	0.37	-0.04	0.06	0.49	0.11	-0.21	-0.11	-0.25	0.03
Body Vibration	0.11	0.63	-0.16	0.13	-0.15	-0.22	-0.08	0.24	-0.13	0.21
Extreme Light	0.02	0.90	-0.03	0.00	-0.14	0.06	-0.08	0.11	0.09	0.23
Conflict Situations	0.47	0.01	0.36	-0.17	0.25	0.00	0.07	0.12	-0.11	0.18
Being Exact	0.40	-0.11	-0.12	0.07	0.11	0.41	-0.27	0.10	-0.35	-0.17
Repeating Tasks	-0.44	0.20	-0.50	-0.18	-0.12	0.38	-0.09	0.30	0.04	-0.07
Indoors	0.01	-0.44	0.04	0.07	0.25	0.49	0.11	0.17	-0.01	-0.41
Outdoors	0.10	0.84	0.03	-0.13	-0.10	-0.32	-0.13	0.02	0.15	0.37
Equipment-set Pace	-0.21	0.10	-0.31	0.29	-0.24	0.32	0.23	0.19	-0.08	0.14
Outcome Responsible	0.98	0.07	0.13	0.04	-0.05	-0.07	0.42	0.07	-0.23	-0.12
Others Health Respon.	0.33	0.38	-0.02	0.12	0.65	-0.10	0.13	-0.08	-0.20	0.25
Distracting Noise	0.04	0.70	-0.17	0.17	-0.06	0.03	0.15	0.15	0.04	0.12
Time Bending	-0.20	0.87	0.06	0.03	0.10	0.04	-0.09	0.04	-0.07	-0.08
Time Climbing	0.05	0.97	-0.04	-0.08	-0.18	-0.13	-0.25	0.15	-0.03	-0.06
Time Keep. Balance	0.07	1.05	0.02	-0.05	0.00	-0.11	-0.23	0.21	-0.07	-0.06
Time Crouching	-0.11	0.84	-0.05	0.04	0.04	-0.01	-0.09	0.02	0.13	-0.03
Time Repeating	-0.50	0.36	-0.21	-0.05	-0.13	0.45	0.03	0.18	0.02	-0.21
Time Sitting	0.29	-0.41	-0.25	-0.05	-0.14	0.25	-0.20	0.31	-0.01	0.25
Time Standing	-0.17	0.67	0.24	-0.03	0.35	-0.03	0.19	-0.05	0.12	-0.31
Time Using Hands	-0.33	0.37	-0.21	0.27	-0.01	0.13	-0.06	0.00	-0.13	-0.16
Time Walking/Running	0.05	0.69	0.39	-0.18	0.31	0.04	0.16	0.04	0.01	0.01
Extreme Temperature	0.01	0.84	-0.07	-0.01	-0.12	-0.18	0.05	0.06	0.06	0.20
Wear Protective Equip.	0.08	0.66	-0.13	0.20	0.20	-0.02	-0.05	-0.17	-0.24	-0.07
Specialized Pro. Equip	0.19	0.62	-0.13	0.08	0.20	0.01	-0.20	-0.10	-0.24	0.04
Ability Utilization	0.79	-0.05	0.00	0.29	0.14	-0.04	-0.16	-0.01	0.06	-0.06
Achievement	0.73	0.01	-0.01	0.26	0.28	-0.13	-0.19	0.02	0.13	0.00
Achive.Mean Extent (ME)	0.77	-0.02	-0.01	0.28	0.21	-0.08	-0.18	0.01	0.09	-0.03
Activity	0.76	0.02	-0.25	-0.10	0.18	0.24	0.23	0.24	0.02	-0.23
Advancement	0.44	-0.02	0.12	0.14	-0.09	0.09	-0.12	0.54	-0.09	-0.19
Authority	0.97	0.00	-0.02	0.08	0.16	-0.21	0.22	0.10	0.04	-0.02
Autonomy	0.83	-0.06	0.13	0.22	-0.06	-0.15	0.00	-0.01	0.11	0.03
Company Policies	0.45	0.03	-0.30	0.01	-0.18	0.08	0.04	0.78	0.16	0.09
Compensation	0.73	0.08	0.13	0.16	-0.14	0.02	-0.16	0.11	-0.23	0.05
Coworkers	0.41	0.26	0.21	-0.13	0.60	0.14	0.10	0.24	-0.10	-0.45
Creativity	0.82	-0.01	0.10	0.31	0.05	-0.18	0.03	0.01	0.25	-0.06
Independence	-0.35	-0.03	-0.10	0.10	-0.55	0.22	-0.20	0.07	0.12	0.23

Indep. ME	0.87	-0.02	0.11	0.27	0.01	-0.19	0.02	0.02	0.14	-0.01
Moral Values	-0.25	0.30	-0.43	0.21	0.02	0.10	0.16	0.36	0.17	-0.31
Recognition	0.66	0.00	0.20	0.25	-0.04	-0.17	-0.18	0.14	0.08	0.02
Recog. ME	0.87	-0.02	0.06	0.17	0.09	-0.13	-0.03	0.20	0.02	-0.04
Relationship ME	0.13	0.14	0.02	0.02	0.90	-0.04	0.04	0.28	0.06	-0.37
Responsibility	0.87	0.01	0.10	0.25	0.04	-0.21	0.01	0.04	0.05	0.01
Security	0.61	-0.09	-0.27	0.07	0.33	0.19	0.01	0.22	-0.02	0.01
Social Service	0.09	-0.11	0.14	-0.01	0.89	-0.18	-0.09	0.06	0.05	-0.10
Social Status	0.82	-0.04	-0.03	0.16	0.18	-0.06	-0.16	0.07	0.00	0.01
HR Supervision	-0.21	0.13	-0.12	0.08	0.15	0.19	-0.19	0.87	0.00	0.04
Technical Supervision	-0.57	0.20	0.20	0.03	0.11	0.14	0.06	0.71	-0.27	-0.01
Support ME	-0.14	0.15	-0.08	0.05	0.03	0.17	-0.03	0.94	-0.05	0.05
Variety	0.83	0.19	0.22	0.15	0.19	-0.22	-0.06	0.03	-0.01	-0.06
Working Conditions	0.42	-0.35	0.06	0.03	-0.09	0.15	-0.10	0.30	0.19	-0.12
Work.Conditions ME	0.74	-0.06	-0.01	0.11	-0.04	0.13	-0.09	0.24	0.03	-0.03