Impact of Income Risk on Health and Well-Being

A. Adeline (THEMA), I. Choinière Crèvecoeur (UQAM),
R. Fonseca (UQAM), P-C Michaud (HEC)

May 9, 2019

Relationship between Income and Health

- Income, health and well-being has been frequently studied.
  - Δ^{+}income $\Rightarrow$ Δ^{+}Health, Δ^{+} Well-being

Relationship between Income and Health

- Income, health and well-being has been frequently studied.
  - Δ^{+}income $\Rightarrow \Delta^{+}$Health, Δ^{+} Well-being
- Previous literature focuses on the effect of single specific income shocks on health and well-being:
  1. **Job loss** (Strully (2009), Sullivan & Von Wachter (2009), Michaud et al. (2016), and Schaller & Stevens (2015))

Relationship between Income and Health

- Income, health and well-being has been frequently studied.
  - Δ^{+}income $\Rightarrow \Delta^{+}$Health, Δ^{+} Well-being
- Previous literature focuses on the effect of single specific income shocks on health and well-being:
  1. **Job loss** (Strully (2009), Sullivan & Von Wachter (2009), Michaud et al. (2016), and Schaller & Stevens (2015))
  2. **Macroeconomic shock** (Clark et al. (2010), McInerney et al. (2013); Jenkins & Lambert (2010))

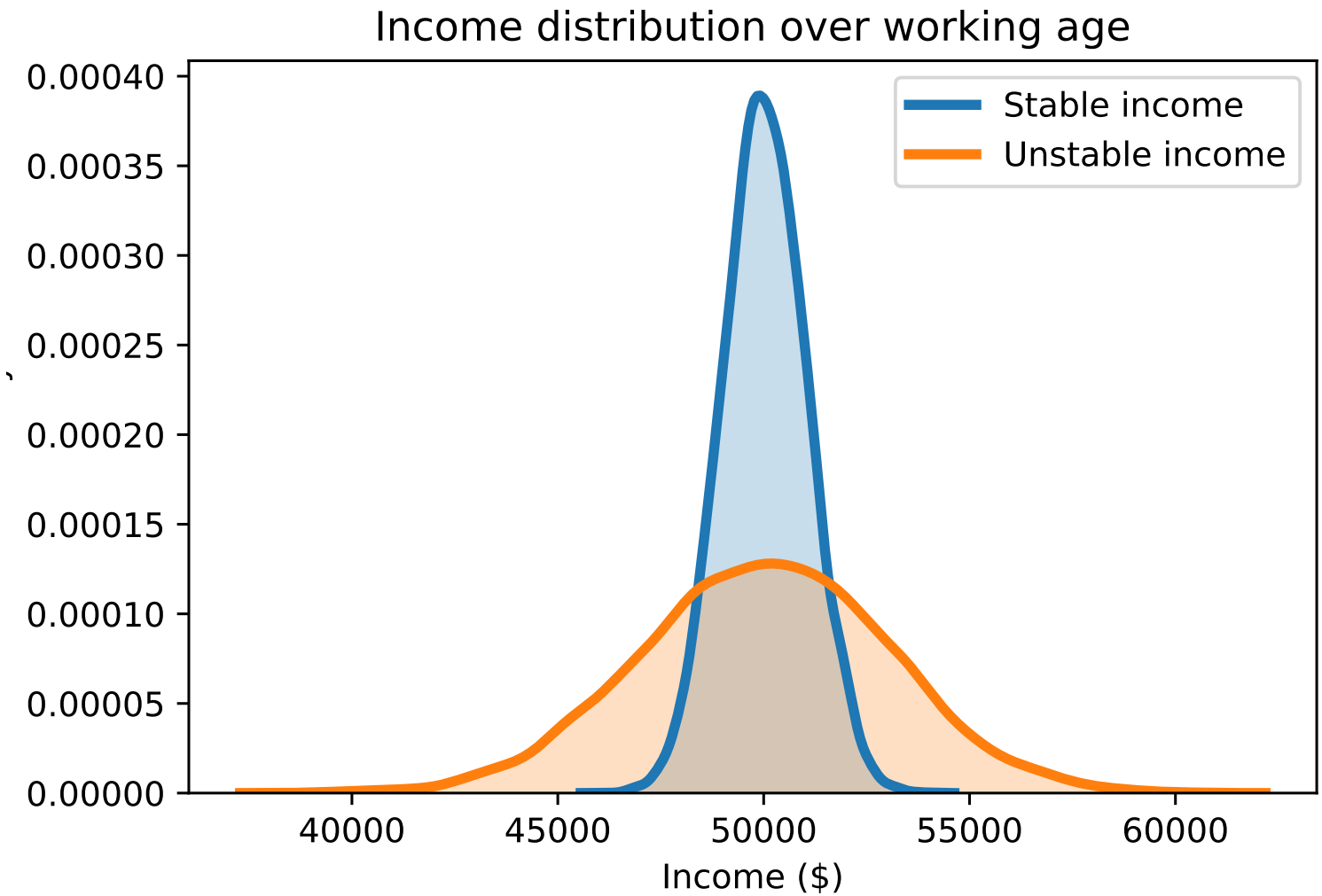
Relationship between Income and Health

- Income, health and well-being has been frequently studied.
  - Δ^{+}income $\Rightarrow \Delta^{+}$Health, Δ^{+} Well-being
- Previous literature focuses on the effect of single specific income shocks on health and well-being:
  1. **Job loss** (Strully (2009), Sullivan & Von Wachter (2009), Michaud et al. (2016), and Schaller & Stevens (2015))
  2. **Macroeconomic shock** (Clark et al. (2010), McInerney et al. (2013); Jenkins & Lambert (2010))
  3. **Receipt of an inheritance** (Meer et al. (2003); Kim & Ruhm (2012))

Relationship between Income and Health

- Income, health and well-being has been frequently studied.
  - Δ^{+}income $\Rightarrow \Delta^{+}$Health, Δ^{+} Well-being
- Previous literature focuses on the effect of single specific income shocks on health and well-being:
  1. **Job loss** (Strully (2009), Sullivan & Von Wachter (2009), Michaud et al. (2016), and Schaller & Stevens (2015))
  2. **Macroeconomic shock** (Clark et al. (2010), McInerney et al. (2013); Jenkins & Lambert (2010))
  3. **Receipt of an inheritance** (Meer et al. (2003); Kim & Ruhm (2012))
  4. **Lottery win** (Gardner & Oswald (2007); Apouey & Clark (2015))

Heterogeneity between individuals



What we do:

- We investigate the impacts of income risk experienced over the working life on health and well-being after 50 years old.

- Data from the Longitudinal and International Study of Adults (LISA)
  - Health and well-being measurement (2012-2014)
  - Identify income risk using Canadian tax records associated to each respondent from 1982 to 2012.

What we do:

1. For each respondent, we estimate variances of the permanent and the transitory components of income.

What we do:

1. For each respondent, we estimate variances of the permanent and the transitory components of income.

   - Permanent: Loss of transfers or an event implying a permanent work stoppage
   - Transitory : Job loss, a transitory work stoppage, group or individual layoffs, or business closures.

What we do:

1. For each respondent, we estimate variances of the permanent and the transitory components of income.
   - Permanent: Loss of transfers or an event implying a permanent work stoppage
   - Transitory : Job loss, a transitory work stoppage, group or individual layoffs, or business closures.
2. Controlling for the average level of income, we estimate the effect of income risk over a working-age period on :
   - Self-Assessed Health
   - Well-being
   - Mental health

Sample Selection (Variances)

Avalible income information (T1 Family File).

Sample Selection (Variances)

Avalible income information (T1 Family File).

Aged 30 to 55 years old between 1982 and 2012:

- No longer at school.
- Not yet retired.

Sample Selection (Variances)

Avalible income information (T1 Family File).

Aged 30 to 55 years old between 1982 and 2012:

- No longer at school.
- Not yet retired.

Male:

- According to th OECD, the labour force participation rate over the working age period considered:
  - Men: 82.9%
  - Women: 69.1% .

Sample Selection (Variances)

Avalible income information (T1 Family File).

Aged 30 to 55 years old between 1982 and 2012:

- No longer at school.
- Not yet retired.

Male:

- According to th OECD, the labour force participation rate over the working age period considered:
  - Men: 82.9%
  - Women: 69.1% .

⇒ **A total of 6,991 observations, 3,698 (2012); 3,293 (2014).**

Income measure

Total Family income before taxes:

- Taxfiler's income from taxable as well as non-taxable sources.
- Deflated using the Consumer Price Index (2013 base year).

Income measure

Total Family income before taxes:

- Taxfiler's income from taxable as well as non-taxable sources.
- Deflated using the Consumer Price Index (2013 base year).
- Family income allows to control for insurance effects between household's members.

Estimating permanent and transitory risk

Logarithm of permanent income:

$$inc_{it} = \gamma p_{it} + inc_{it-1} + \eta_{it} \quad \forall t, i \tag{1}$$

Estimating permanent and transitory risk

Logarithm of permanent income:

$$inc_{it} = \gamma p_{it} + inc_{it-1} + \eta_{it} \quad \forall t, i \tag{1}$$

Logarithmic transformation of current income:

$$y_{it} = inc_{it} + \epsilon_{it}. \tag{2}$$

Estimating permanent and transitory risk

Logarithm of permanent income:

$$inc_{it} = \gamma p_{it} + inc_{it-1} + \eta_{it} \quad \forall t, i \tag{1}$$

Logarithmic transformation of current income:

$$y_{it} = inc_{it} + \epsilon_{it}. \tag{2}$$

Income difference between d years as:

$$(y_{it+d} - y_{it}) = inc_{it+d} + \epsilon_{it+d} - inc_{it} - \epsilon_{it} \tag{3}$$

Estimating permanent and transitory risk

Recursively substituting equation (1):

$$(y_{it+d} - y_{it}) = (\eta_{it+1} + \eta_{it+2} + ... + \eta_{it+d}) + \epsilon_{it+d} - \epsilon_{it} \qquad (4)$$

Estimating permanent and transitory risk

Recursively substituting equation (1):

$$(y_{it+d} - y_{it}) = (\eta_{it+1} + \eta_{it+2} + ... + \eta_{it+d}) + \epsilon_{it+d} - \epsilon_{it} \quad (4)$$

Variance of equation (4) is given by:

$$Var(y_{it+d} - y_{it}) = d\sigma^2_{i\eta} + 2\sigma^2_{i\epsilon} \quad (5)$$

Estimating permanent and transitory risk

Recursively substituting equation (1):

$$(y_{it+d} - y_{it}) = (\eta_{it+1} + \eta_{it+2} + ... + \eta_{it+d}) + \epsilon_{it+d} - \epsilon_{it} \quad (4)$$

Variance of equation (4) is given by:

$$Var(y_{it+d} - y_{it}) = d\sigma^2_{i\eta} + 2\sigma^2_{i\epsilon} \quad (5)$$

$$\Rightarrow (\mathbf{y_{it+d}} - \mathbf{y_{it}})^2 = d\sigma^2_{i\eta} + 2\sigma^2_{i\epsilon}$$

Estimating permanent and transitory risk

For each respondent:

1. Remove the predictable growth from the income process.
   - Identify $\mathbf{y_{it}}$: Specific OLS by levels of education and provinces.
   - Control for age_t, age_t^2, $Marital\ Status_t$, $Disability_t$.

Estimating permanent and transitory risk

For each respondent:

1. Remove the predictable growth from the income process.
   - Identify $\mathbf{y_{it}}$: Specific OLS by levels of education and provinces.
   - Control for age_t, age_t^2, $Marital\ Status_t$, $Disability_t$.
2. Create dataset of $\frac{T(T+1)}{2}$ observations based on equation (5):

Estimating permanent and transitory risk

For each respondent:

1. Remove the predictable growth from the income process.
   - Identify $\mathbf{y_{it}}$: Specific OLS by levels of education and provinces.
   - Control for age_t, age_t^2, $Marital\ Status_t$, $Disability_t$.
2. Create dataset of $\frac{T(T+1)}{2}$ observations based on equation (5):

$$\mathbf{(y_{i,t+d} - y_{i,t})^2 = d\sigma_{i\eta}^2 + 2\sigma_{i\epsilon}^2}$$

$$(y_{i,2012} - y_{i,2007})^2 = 5\sigma_{i\eta}^2 + 2\sigma_{i\epsilon}^2$$
$$(y_{i,2012} - y_{i,2008})^2, (y_{i,2011} - y_{i,2007})^2 = 4\sigma_{i\eta}^2 + 2\sigma_{i\epsilon}^2$$
$$(y_{i,2012} - y_{i,2009})^2, (y_{i,2011} - y_{i,2008})^2, (y_{i,2010} - y_{i,2007})^2 = 3\sigma_{i\eta}^2 + 2\sigma_{i\epsilon}^2$$
$$\dots$$

Estimating permanent and transitory risk

For each respondent:

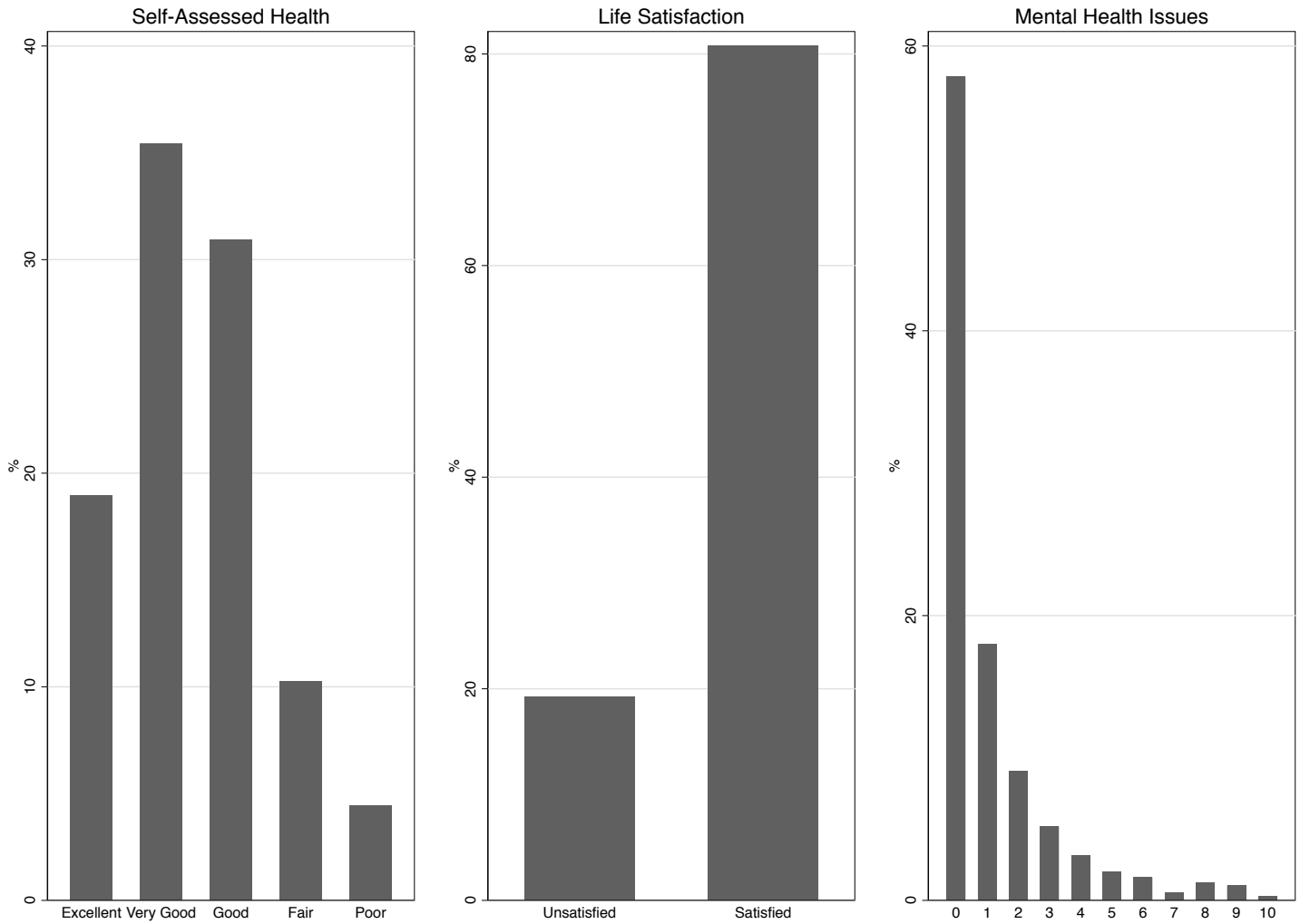
1. Remove the predictable growth from the income process.
   - Identify $\mathbf{y_{it}}$: Specific OLS by levels of education and provinces.
   - Control for age_t, age_t^2, $Marital\ Status_t$, $Disability_t$.
2. Create dataset of $\frac{T(T+1)}{2}$ observations based on equation (5):

$$(\mathbf{y_{i,t+d}} - \mathbf{y_{i,t}})^2 = \mathbf{d}\sigma^2_{\mathbf{i}\eta} + \mathbf{2}\sigma^2_{\mathbf{i}\epsilon}$$

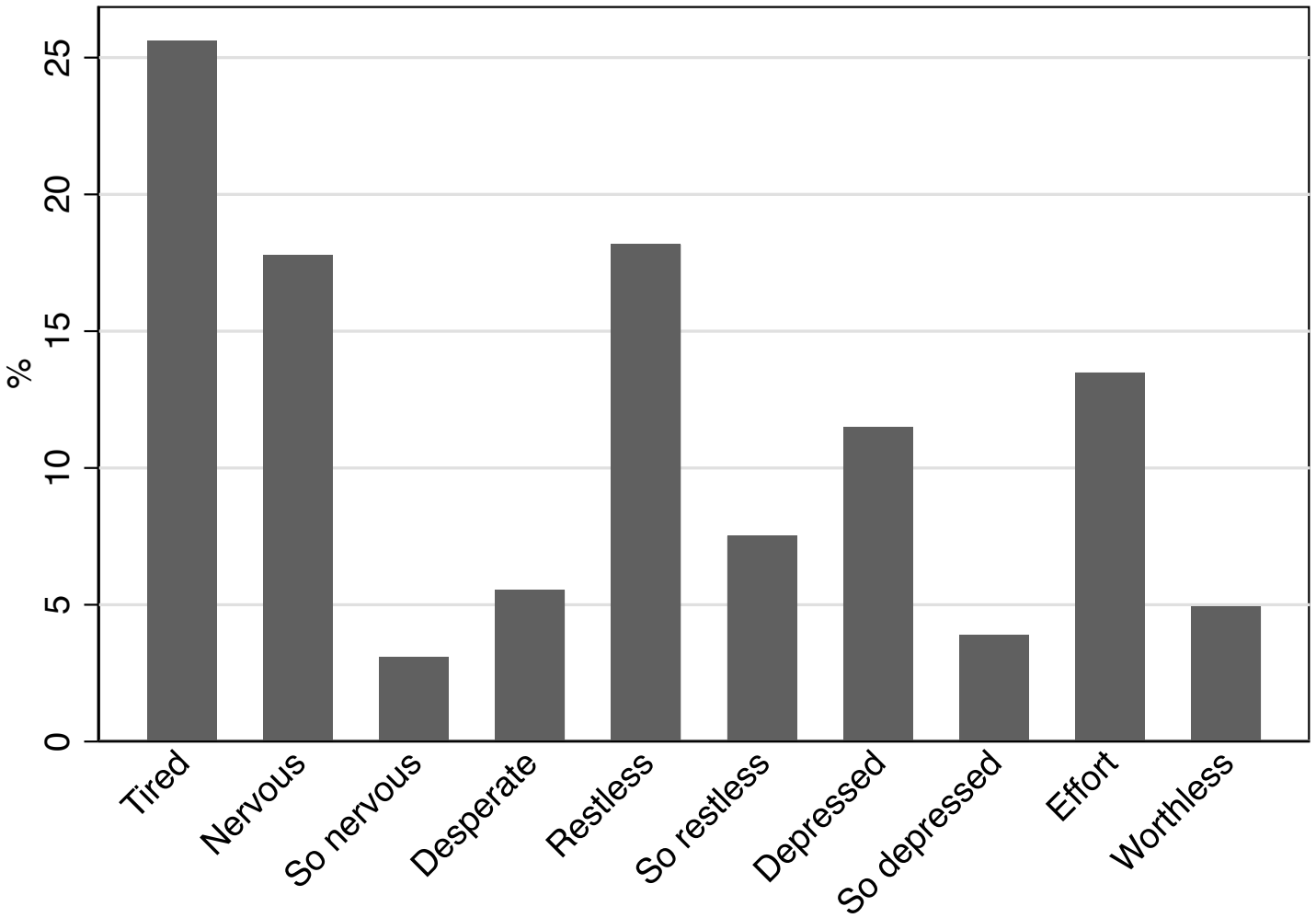
$$(y_{i,2012} - y_{i,2007})^2 = 5\sigma^2_{i\eta} + 2\sigma^2_{i\epsilon}$$
$$(y_{i,2012} - y_{i,2008})^2, (y_{i,2011} - y_{i,2007})^2 = 4\sigma^2_{i\eta} + 2\sigma^2_{i\epsilon}$$
$$(y_{i,2012} - y_{i,2009})^2, (y_{i,2011} - y_{i,2008})^2, (y_{i,2010} - y_{i,2007})^2 = 3\sigma^2_{i\eta} + 2\sigma^2_{i\epsilon}$$
$$\dots$$

3. Estimate an OLS of $(\mathbf{y_{it+d}} - \mathbf{y_{it}})^2$ on $\mathbf{d}$ and $\mathbf{2}$.

Health and Well-Being Distribution (50 to 75 years old)



Mental Health Distribution (50 to 75 years old)



Specifications

- σ_η^2 : Variance of the permanent component of income.
- σ_ϵ^2 : Variance of the transitory component of income.

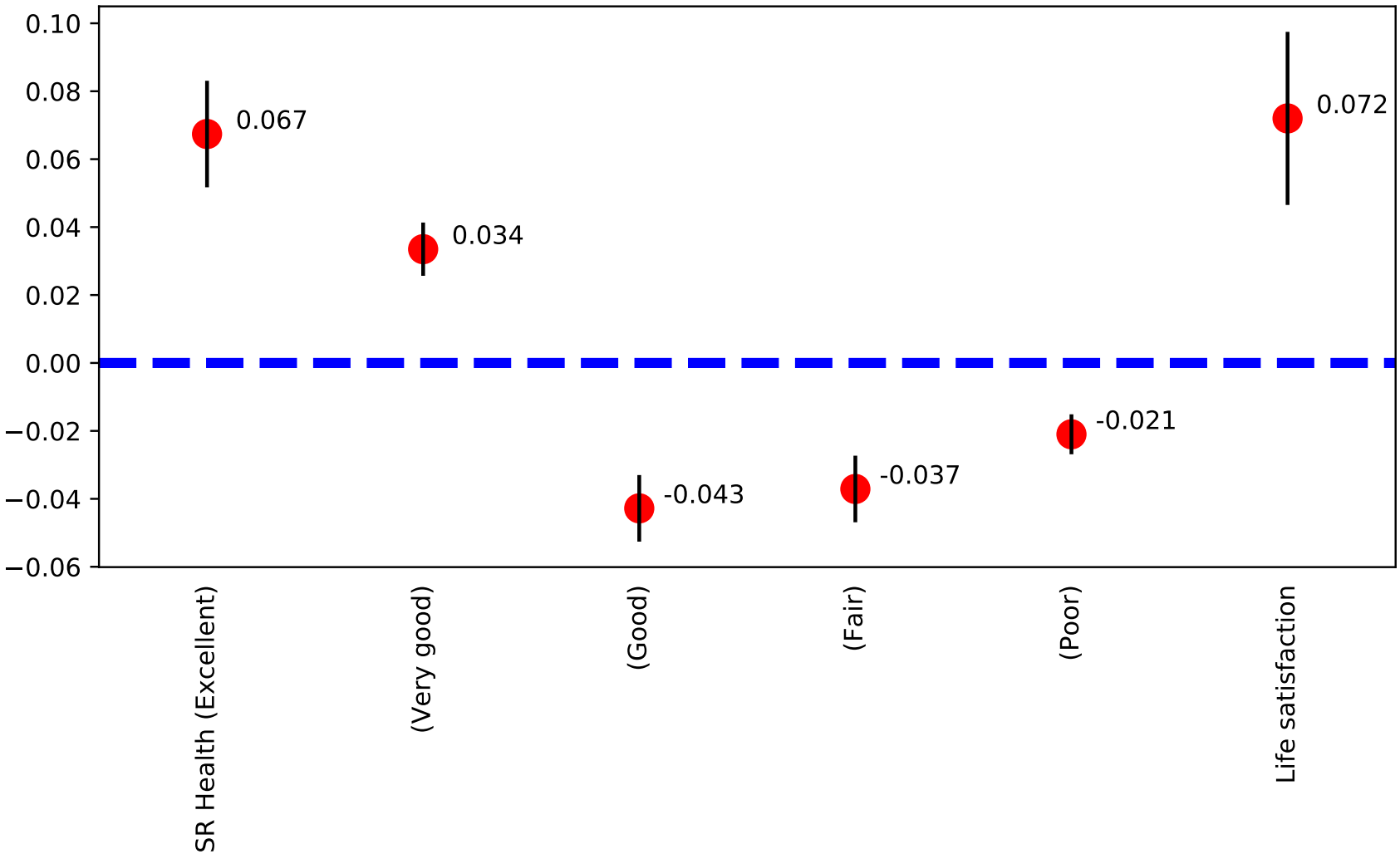
Specifications

- σ_η^2 : Variance of the permanent component of income.
- σ_ϵ^2 : Variance of the transitory component of income.
- Log of average annual income between 30 and 55 years old.

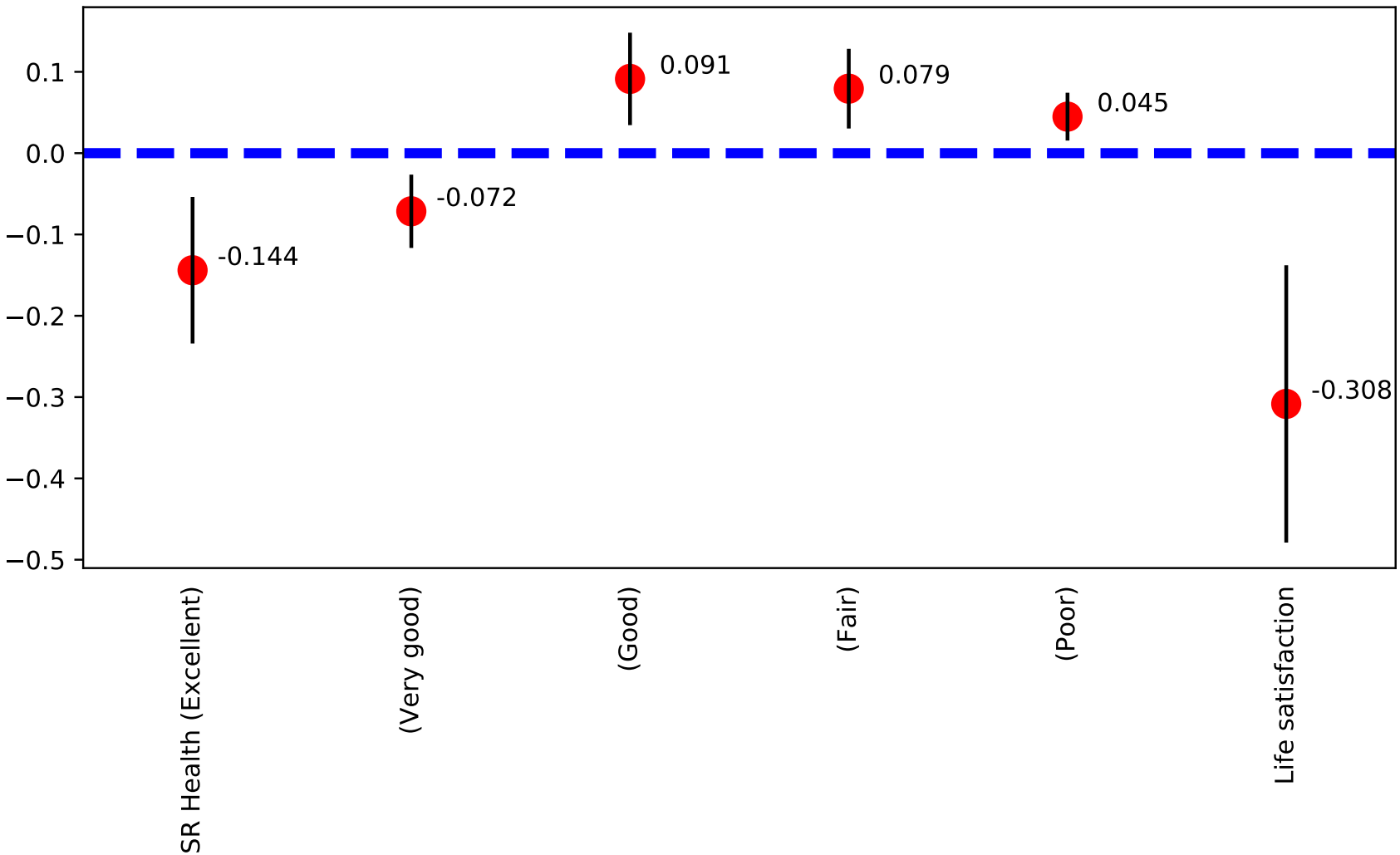
Specifications

- σ_η^2 : Variance of the permanent component of income.
- σ_ϵ^2 : Variance of the transitory component of income.
- Log of average annual income between 30 and 55 years old.
- Age (group of 5 years)
- Education (4 categories)
- Provinces (Qc, On, BC, Prairies, Atlantics)
- Marital status
- Number of children
- Born in Canada

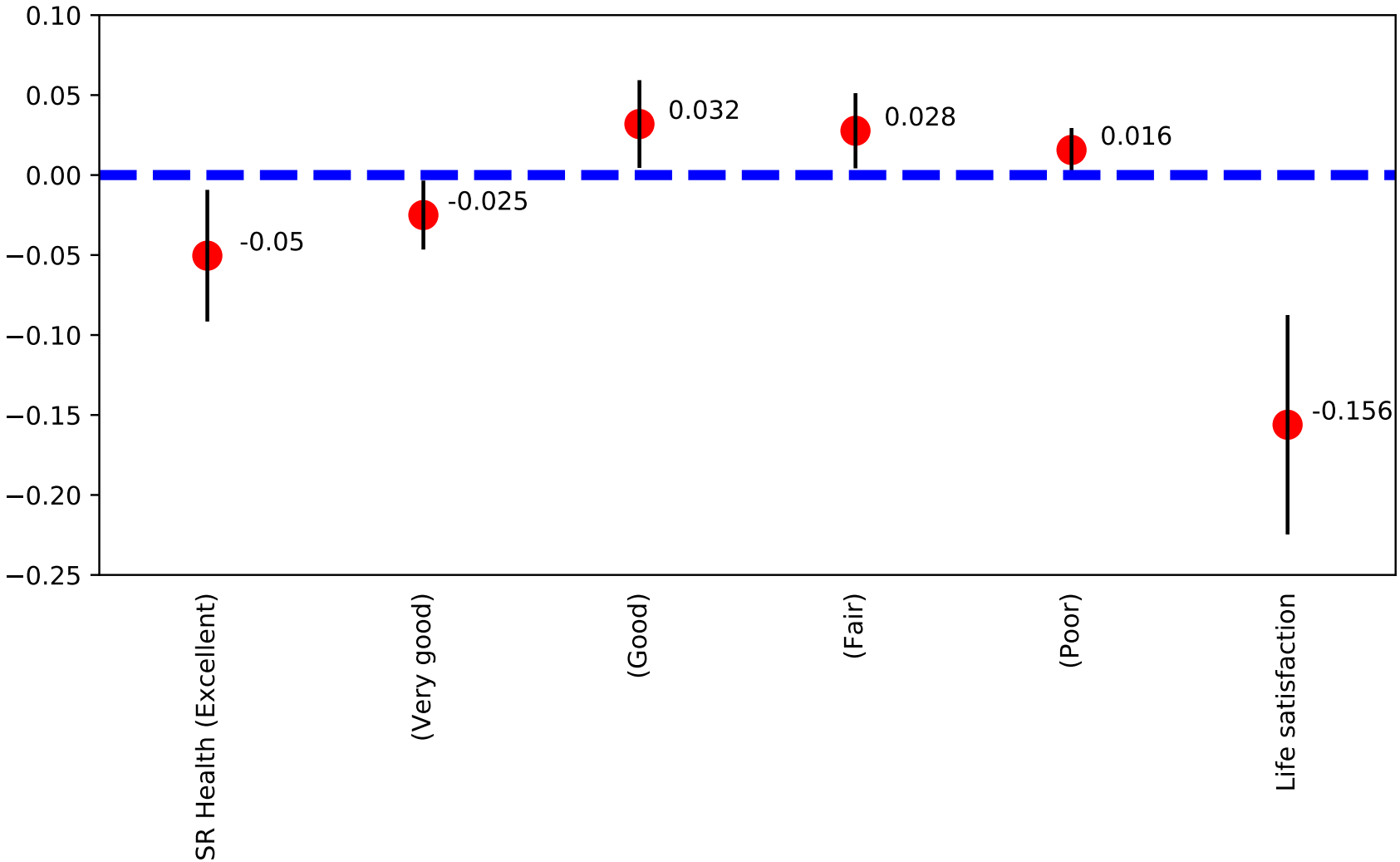
Log of the Average Income



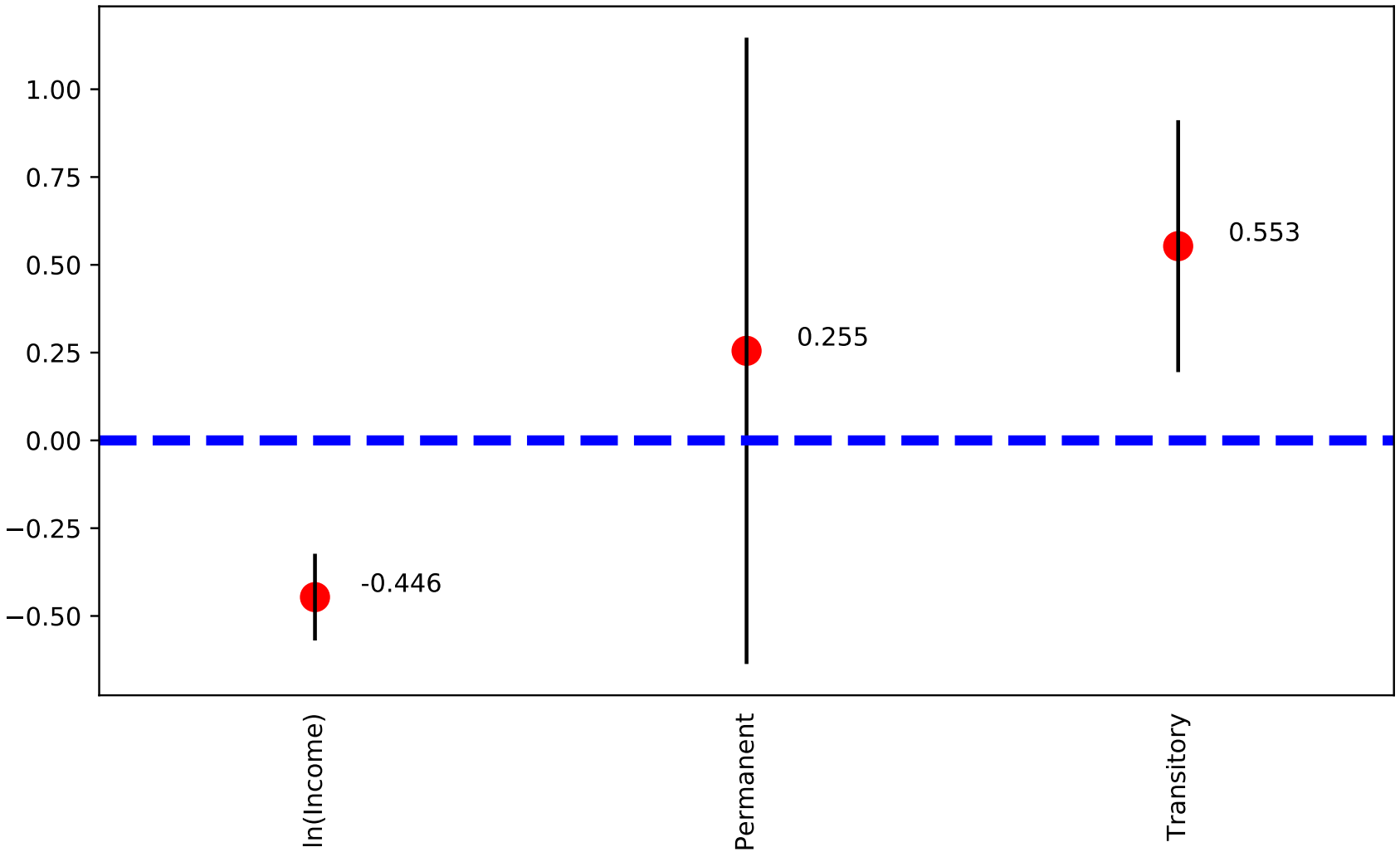
Permanent Income risk



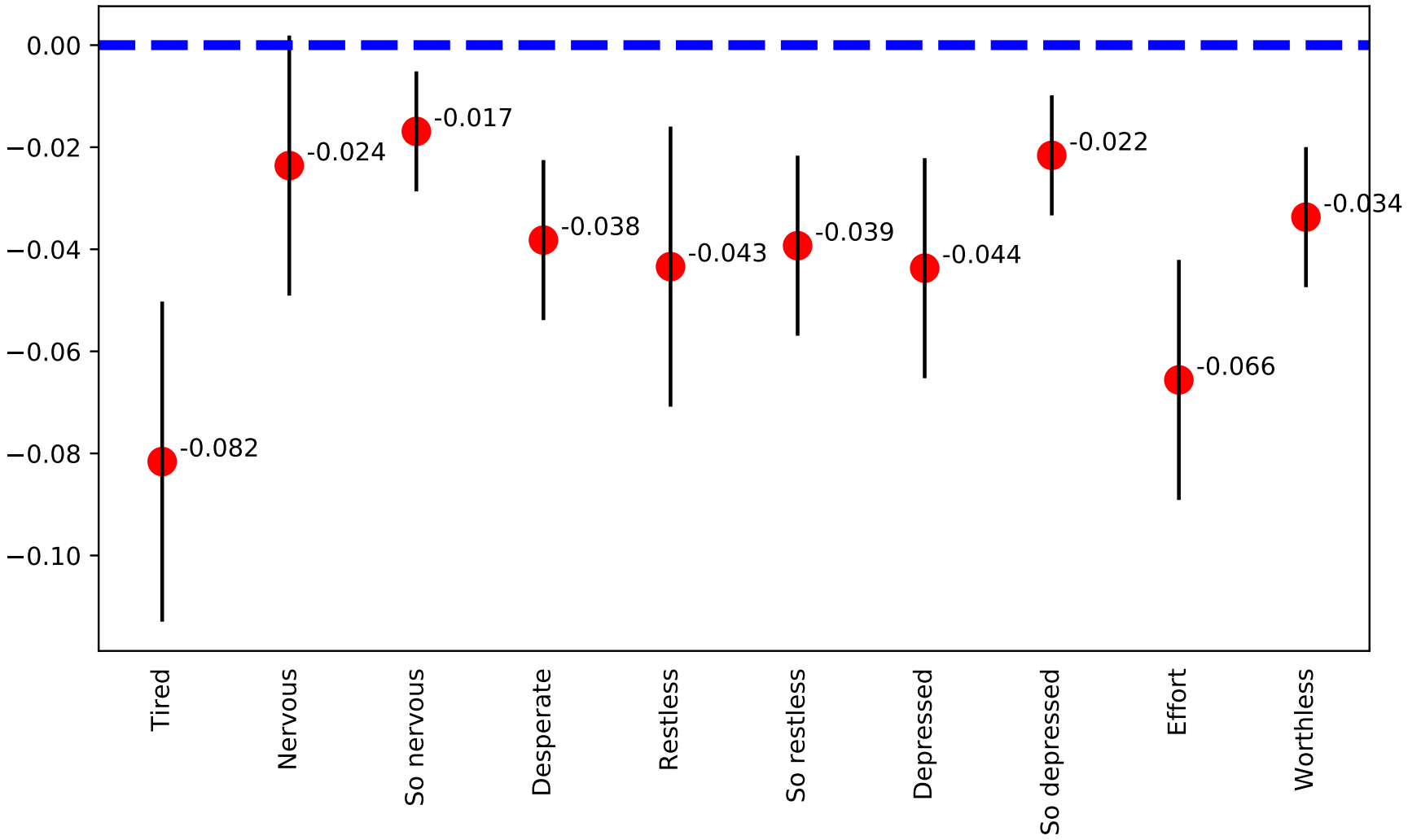
Transitory Income risk



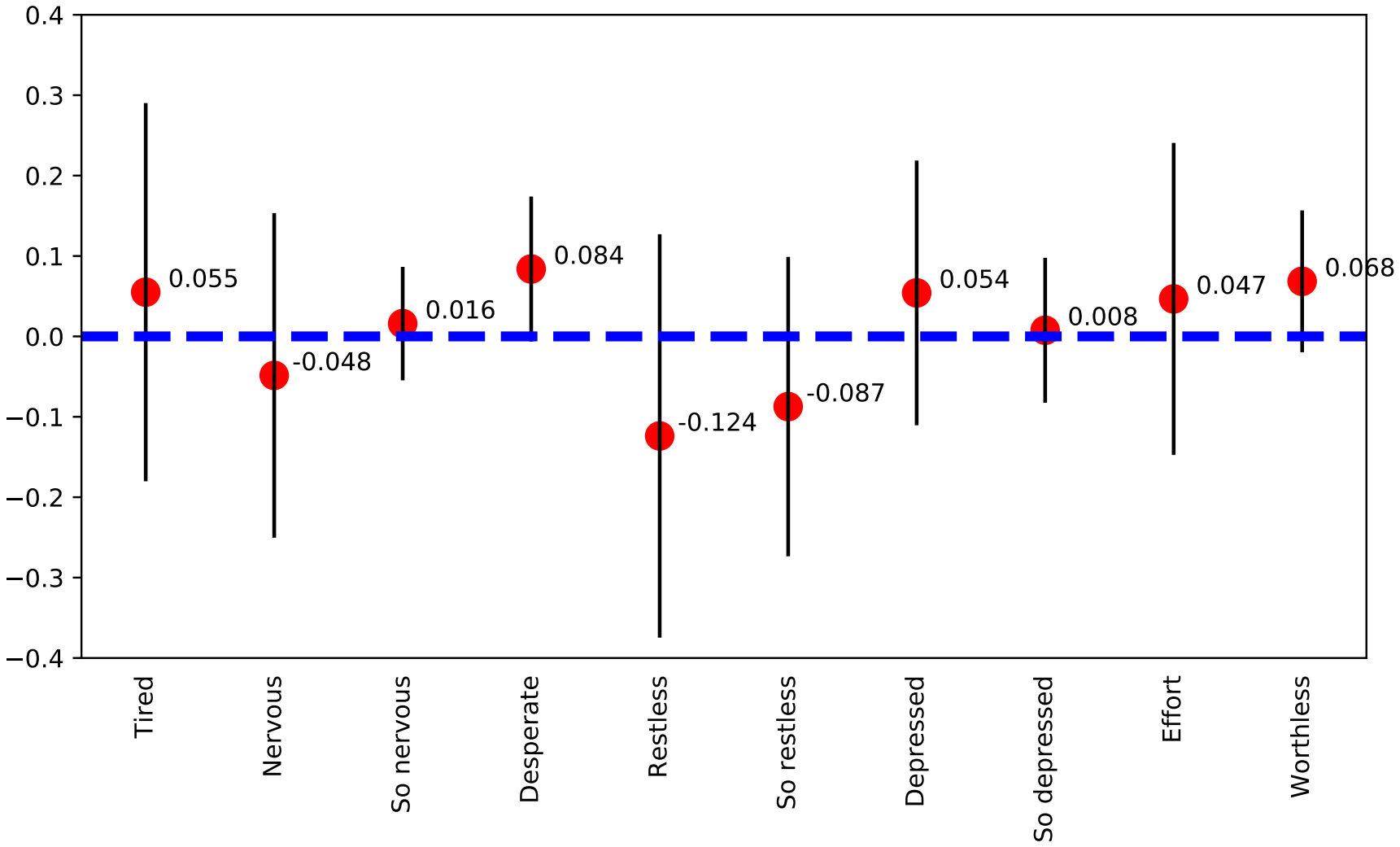
Number of mental health issues



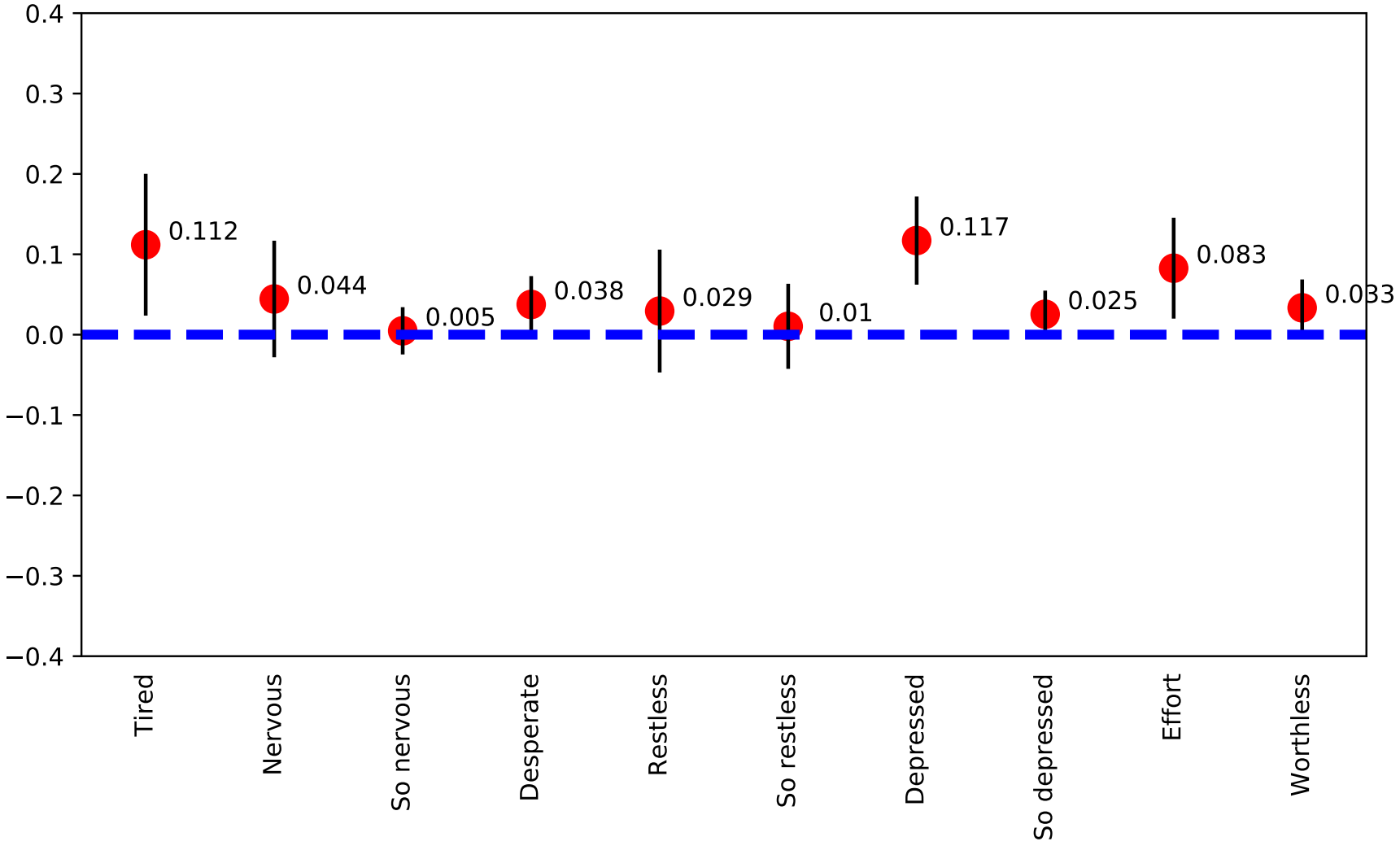
Mental Health (Log of the Average Income)



Mental Health (Permanent Income risk)



Mental Health (Transitory Income risk)



Robustness Specifications

1. Control for the number of relationships.
    - Individuals may have been in a relationship with different people who earned different annual incomes.

Robustness Specifications

1. Control for the number of relationships.
   - Individuals may have been in a relationship with different people who earned different annual incomes.

2. Exclude individuals who have already reported an income less than 20% of their average income.
   - Reduce effects of outliers.
   - Periods during which individuals could have worked abroad.

Robustness Specifications

1. Control for the number of relationships.
   - Individuals may have been in a relationship with different people who earned different annual incomes.

2. Exclude individuals who have already reported an income less than 20% of their average income.
   - Reduce effects of outliers.
   - Periods during which individuals could have worked abroad.

3. Keep only respondent with at least 20 observations between 30 and 55 years old.
   - $\sigma_{\eta i}$ and $\sigma_{\epsilon i}$ estimated with more precision.
   - But lose all respondent over 65 years old.

Conclusion

- To the best of our knowledge, we are the first to study the relationship between income volatility, health and well-being.

Conclusion

- To the best of our knowledge, we are the first to study the relationship between income volatility, health and well-being.
- Researcher should continue to study this relationship:
  - More complete data could avoid the potential endogeneity issues.