Stress and Coping
–
An Economic Approach

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September 2015

1. Introduction

- Stress is known by everybody
    - At times, there are just too many demands ...
    - ... and not enough resources
- Stress ...
    - ... has been introduced in 1936 by Selye (borrowing from physics)
    - ... is a disturbingly prominent topic
        - "Stressbericht 2012" by Bundesanstalt für Arbeitsschutz und Arbeitsmedizin
        - lot of talk about burnout syndrome
        - the rise of psychological diseases in overall diseases and more ...

1. Introduction

The open issue

- Why do economists not work on stress?
- Economic world hosts a large group of stress-inducers
    - (Biased) Technological change
    - Globalisation
    - Unemployment
    - Financial and Euro crisis
    - ... are all "good" sources of stress
- A conceptual framework is missing for economic model building
- We need to bring more psychology into economics (Rabin, 2013)

1. Introduction

The objectives

- Provide a conceptual framework that allows to understand
  stressors – appraisal – stress – coping

  - Stressors: Anything that puts demand on resources of an individual
  - Appraisal: Process of evaluating a stressor concerning its implication
    for well-being of a person
  - Stress: Subjective feeling resulting from current and past appraisals of
    stressors
  - Coping: Behaviour aimed at reducing stress

- Apply this framework to understand optimal reaction to stress

  - Which coping strategies are chosen, i.e. which reactions to stress can
    be observed?
  - How does stress translate into more or less aggressive coping patterns
    (smooth stress regulation vs. "emotional outbursts")?
  - Beyond stressors and appraisal, understand the effect of (theory
    consistent) personality on coping

2. Stress, personality and coping

2.1 The origins of stress

Stress can have many sources, some of which ...

- .... occur rarely (death of spouse, new job, move house ...)
  - Rare events imply positive or negative surprises $g(t)$
  - Random variable $h(t)$ and subjective expectation μ yield surprise

    $$g(t) = h(t) - \mu$$

    (Bell, 1985, Loomes and Sugden, 1986)
  - surprises occur at a certain arrival rate
  - (dynamic continuous time model with Poisson uncertainty)
- ... are of a daily nature (emails, traffic jams, smile of a nice person ...)
  - Flow of demand $p(t)$ paired with
  - abilities $a(t)$ of individual yields
  - intensity $p(t) / a(t)$ of stressor

2. Stress, personality and coping

How do emotional tension and well-being interact?

- Direct channel affects well-being (utility) directly (Stress symptoms like headache, dizziness, sweating, sleeplessness ...)
- Indirect channel affects labour income of the individual via "cognitive load"
- Both channels affect instantaneous utility $u\left(c\left(t\right), W\left(t\right)\right)$

2. Stress, personality and coping

Emotion-focused (not problem-focused) and automatic vs. controlled processes

- controlled process
    - talking to a friend, a colleague, a therapist
    - reduces tension by "sorting things out", i.e. by rationalizing events
    - practice some (endurance) sport
    - take a break and enjoy leisure
    - stress reduces gradually due to depreciation function $\delta\left(m\left(t\right),.\right)$

- automatic process – emotional outbursts
    - individuals feel overwhelmed by stressors
    - emotional tension rises to much, they "can't help" but explode
    - individuals start crying, shout at others, call other people names
    - relatively short event
    - outburst reduces tension by a fixed amount Δ

$$W\left(\tau\right) = W\left(\tau_{-}\right) - \Delta$$

2. Stress, personality and coping

- Emotional tension $W(t)$ is a state variable

$$
\begin{aligned}
dW(t) &= \left\{ \phi \frac{p}{a} W(t) - \delta_0 W(t) - \delta_1 m(t) \right\} dt \\
&\quad - \chi \left[h(t) - \mu \right] dq(t)
\end{aligned}
$$

- Deterministic part displays
  - stressors p and ability a, both are exogenous and fixed
  - ϕ as appraisal parameter of stressor
  - δ_0 as autonomous stress reduction ability
  - coping $m(t)$ that leads to
  - smooth reduction of tension given productivity δ_1
- Stochastic part displays
  - surprises $h(t) - \mu$, exogenous and random in level
  - appraisal of surprises captured by χ
  - Poisson process $q(t)$ with exogenous arrival rate
- "Outburst technology"

$$
W(t) = W(t_-) - \Delta
$$

2. Stress, personality and coping

2.4 Formal modelling
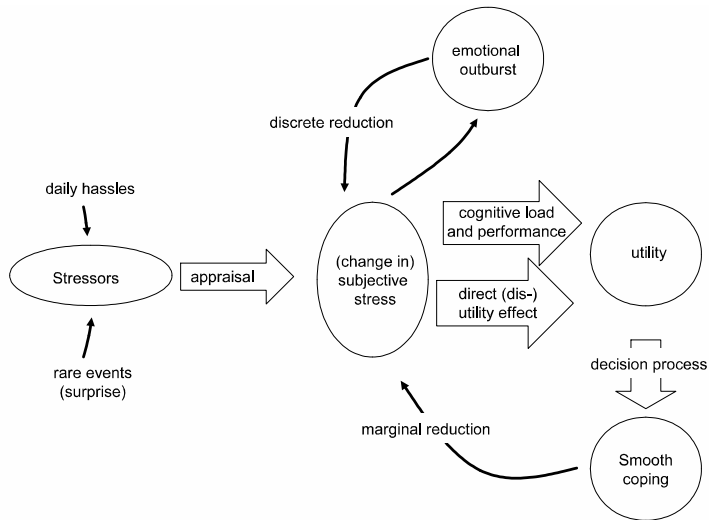
3. Optimal coping

How does an individual behave?

- Individual chooses smooth coping $m(t)$ ...
- ... taking outbursts into account
- Outbursts occur when tolerance level $\bar{W}$ is hit

Formal structure

- Optimal stopping problem with exogenous stopping

$$E_t \int_t^\infty e^{-\rho[\tau-t]} \left[u\left(c\left(\tau \right), W\left(\tau \right) \right) - v\left(m\left(\tau \right) \right) \right] d\tau - \Sigma_{i=1}^n e^{-\rho[\tau_i-t]} v^M$$

- Choosing a path $\left\{ m\left(\tau \right) \right\}_t^\infty$ anticipating outbursts at $\bar{W}$ and taking constraints on $W(t)$ into account

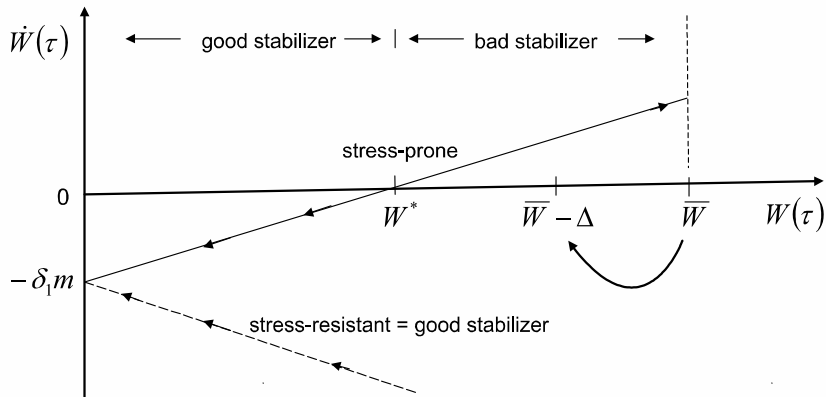Closed form solution (under mild parameter restriction)

- Optimal constant coping level

$$m = \left(\frac{\delta_1}{v_0} \frac{v^M}{\Delta} \frac{1}{1+\zeta} \right)^{1/\zeta}$$

4. Stress and coping patterns

4.1 Dynamics of stress and coping and personality

- How does stress translate into more or less aggressive coping patterns (in a world *without* surprises)?
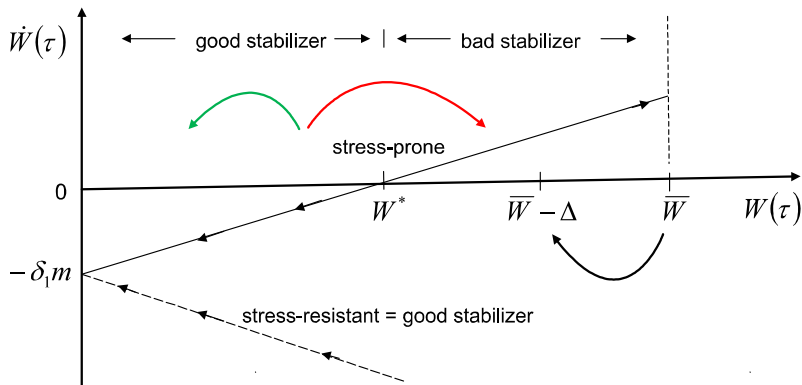

$$\dot{W}(t) = \Phi W(t) - \delta_1 m, \quad \Phi \equiv \phi \frac{p}{a} - \delta_0 \text{ "growth rate of stress"}$$

4. Stress and coping patterns

4.1 Dynamics of stress and coping and personality

- How does stress translate into more or less aggressive coping patterns (in a world *with* surprises)?

$$dW(t) = \{\Phi W(t) - \delta_1 m\} dt - \chi [h(t) - \mu] dq(t)$$

4. Stress and coping patterns

4.3 The outburst theorem

4.4 Temporary stressors and permanent stress?

$\rightarrow$ yes, for stress-prone individuals

$\rightarrow$ not for stress-resistant individuals

5 How to deal with emotional outbursts?

5.1 Is suppressing outbursts a good idea?

$\rightarrow$ no, things might get worse

$\rightarrow$ stress could rise and outburst cycles might result

5.2 The frequency of outbursts

5.3 The gains from psychotherapy

5.4 Structurally estimating personality

6. Conclusion

Background

- Stress is a feeling that everybody experiences (at least) every now and then
- Stress induces various coping styles
- This paper looked at smooth coping and emotional outbursts
  - Smooth coping stands for controlled and cognitive approach to emotion regulation
  - Emotional outbursts stand for more impulsive, costless and fast approach
  - Emotional outbursts tend to be socially harmful (in contrast to constructive smooth coping)

6. Conclusion

Dynamics of stress and coping and personality

- Stress falls steadily over time for stress-resistant individuals ("good stabilizers")
- Stress can rise or fall for stress-prone individuals ("good stabilizers" or "bad stabilizers")
- Bad stabilizers eventually hit the tolerance level $\bar{W}$ and outburst occurs (or outburst cycles)
    - cost and benefits of smooth coping
    - cost and benefits of outbursts

Prevalence of outbursts (outburst theorem)

- personality: stress-prone vs. stress-resistant individuals
- appraisal type ϕ, situation p, ability a and autonomous stress-reduction potential δ_0

6. Conclusion

Do temporary shocks have permanent effects?

- Personality matters a lot
- Reducing stressors temporarily removes symptoms (high stress, frequent outbursts) ...
- ... and can permanently reduce stress for stress-prone individual
- Shocks can permanently push (stress-prone) individual to outburst cycles

Is suppressing outbursts a good idea?

- Yes: outburst comes later
- No: Increasing the tolerance level $\bar{W}$ might lead to outburst cycles

The frequency of outbursts
The gains from psychotherapy
Structurally estimating personality

- Please see paper for details

Thank you!