



CERE

The value of recycling

from Norrland's perspective

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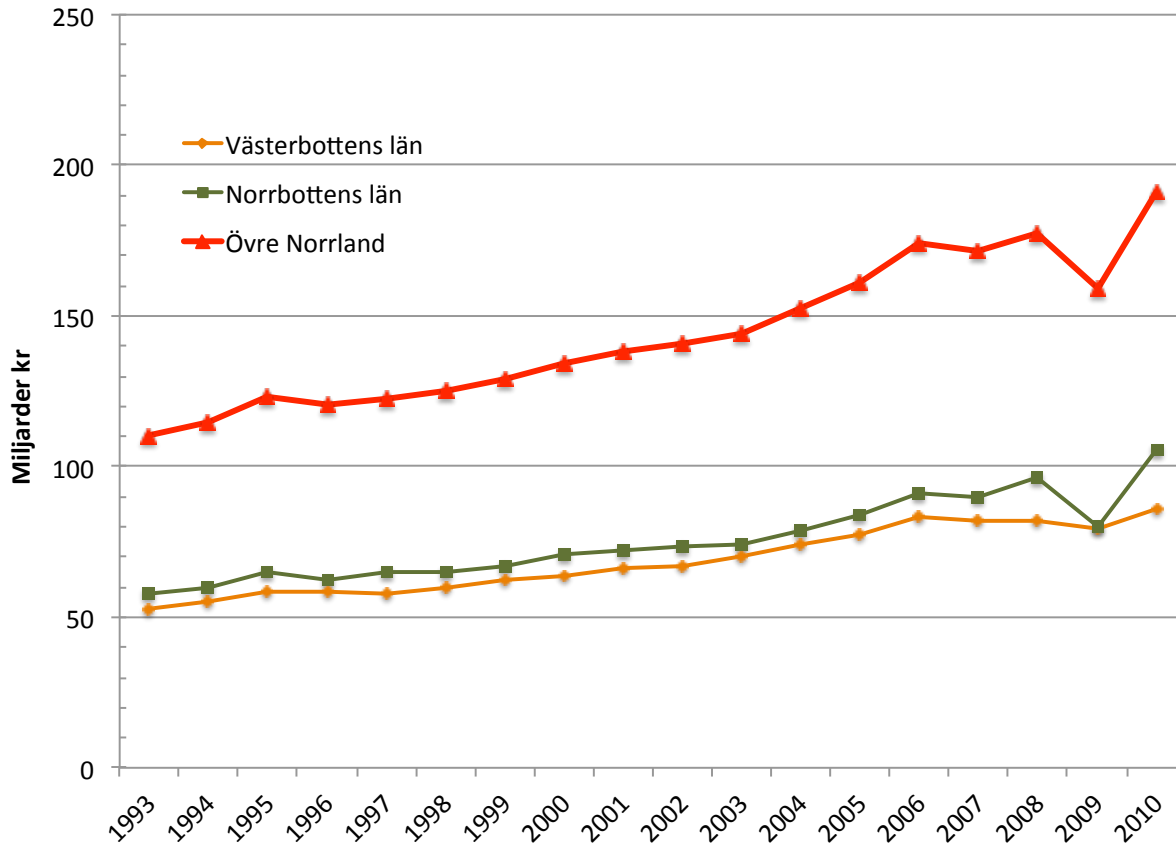
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What I will talk about

- Why is this interesting from Norrland's perspective?
- Why recycling?
- Do we need policy intervention for recycling?
- What does it mean for a region like Norrland?
- Rounding up

Norrland's GDP (GRP)



- Steady and stable growth until 2008
- Sharp decrease 2009 and a sharp rebound in 2010
- Norrland's economy seems to have become more "volatile"

Three interesting issues

- Does GDP say anything about Norrland's wealth, and hence future well being for people in Norrland?
- Is the historical growth rate sustainable in the long run?
- Why do we see more variation in GRP the last years?

What is GRP?

- GRP is the value of production in the region a specific year
 - Included in this is gross investment
 - If a firm just replace a machine GRP increases
 - Capital depreciation is not included in GRP
 - GRP does not include production of non-market goods and services such as negative and/or positive externalities

Problems with GRP (and GDP)

- Capital depreciation is not accounted for
 - Suppose GRP is the value from extracting ore from a mine
 - Means that the measured GRP (income) is not sustainable in the long run (GRP=0 in the long run)
- GRP must be corrected by capital depreciation (extraction) to reflect welfare (in the long run)

Problems with GRP (GDP)

- Production (and consumption) have side effect that are not accounted for
 - Emissions from factories
 - Leakage from mines, etc.
- Natural resources produces goods and services that are not accounted for
 - Nature experiences
 - Fishing and hunting, etc.
 - Eco services (carbon storage in forests)

How should we measure welfare?

A more correct measure of welfare is then:

GreenNRP = GRP – capital depreciation – environmental damage + eco services

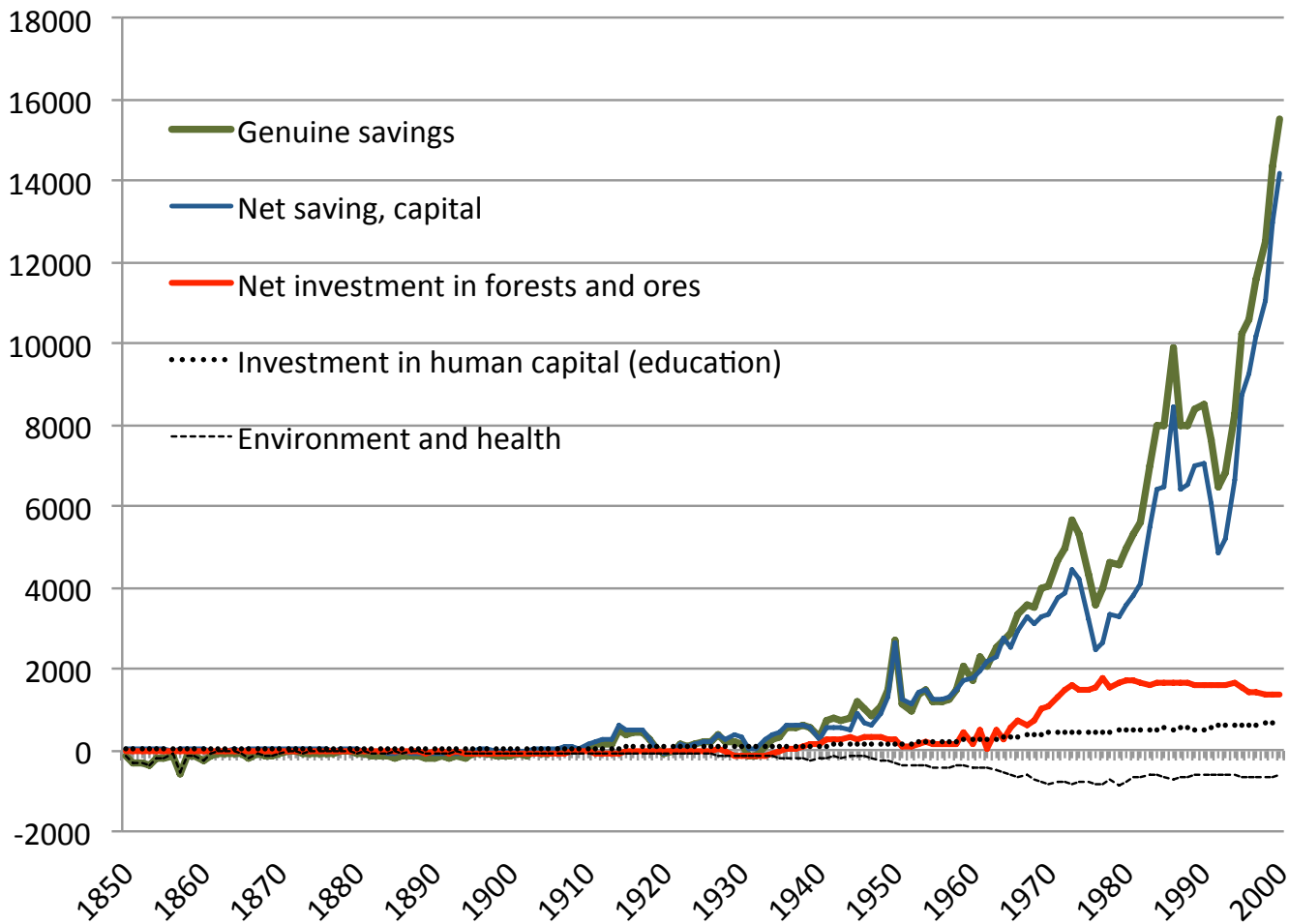
We can also express this in terms of genuine savings:

GS = net investment in capital + net investment in natural capital stocks + eco services

If ***GS*** ≥ 0 (or ***GreenNRP*** is increasing) we are on a sustainable path

Genuine savings, an example

Sweden, 1850-2000 (1913 prices)



Source: Acar & Lindmark (2012)

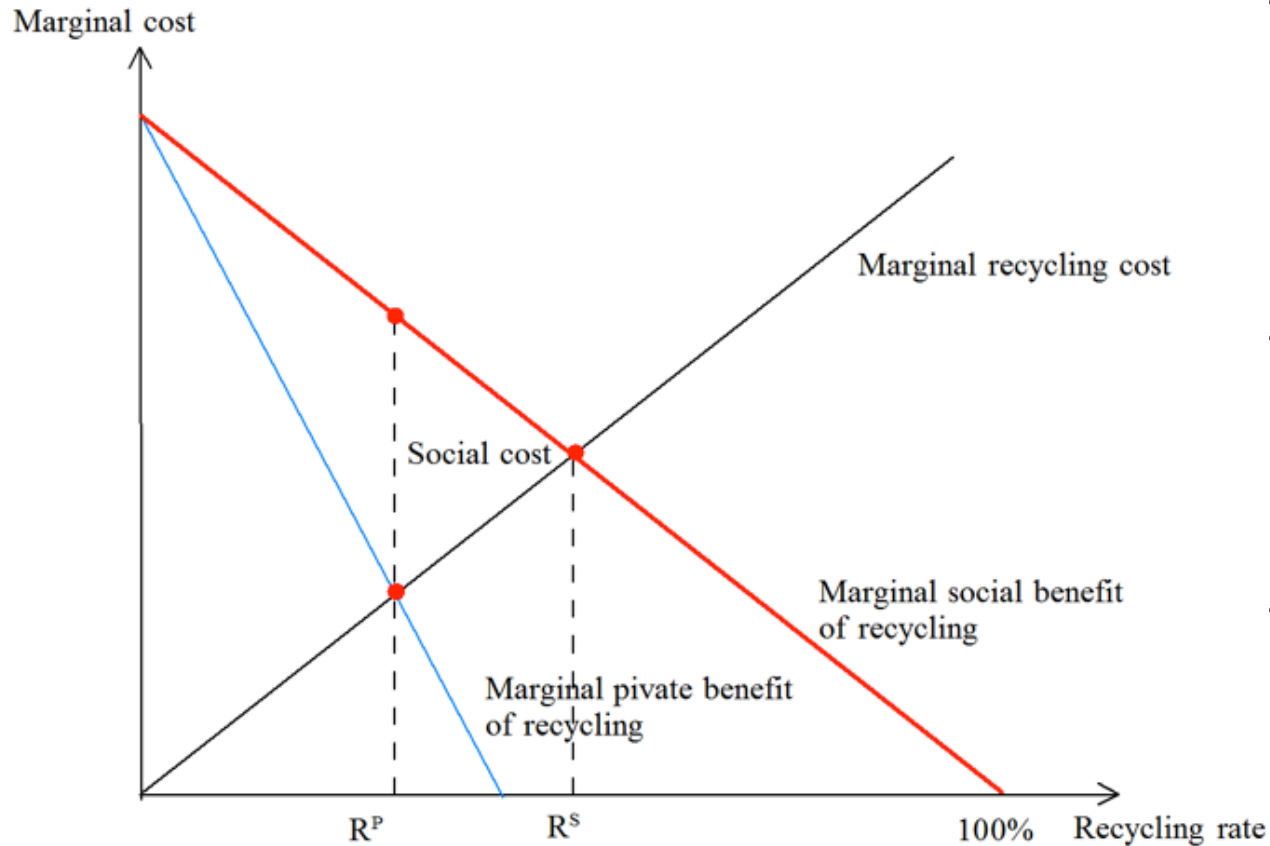
Implications for Norrland

- Norrland's economy is natural resource dependent
 - Renewable resources (forests, hydro- and wind power)
 - Non-renewables (ores and metals)
- From a sustainability perspective:
 - How the natural resources are used
 - Are “profits” reinvested in the regions
 - Can the resource base be expanded by recycling?

Why recycling

- Recycling expands the resource base
- Contributes to a sustainable development (and income)
- The recycled material has a value
- Extraction of virgin materials creates social costs (environmental damage) not accounted for by the market
- Disposal of “waste” imposes social costs not accounted for by the market

How much?



- To little will be recycled if there are negative social effects from waste disposal and extraction
- We should recycle as long as the benefits are higher than the costs
- Recycling have no value in itself, we should not do it by all means

Policy interventions

supply side

- Environmental damage from resource extraction
 - Regulate the extraction industry
 - Put a price (tax, charge) on the virgin resource
- Environmental damage control of abandoned mines
 - Industry tax (probably no good)
 - Reclamation bonds
 - A Within industry insurance system

Policy interventions

demand side

- If waste disposal is a social problem
 - Create incentive schemes for NOT disposing waste
 - Deposit refund schemes
 - Producer responsibility schemes
 - Charges on waste
 - Provide incentives to create “institutions” that enables a build up of recycling systems
- Sweden and some other countries have come far

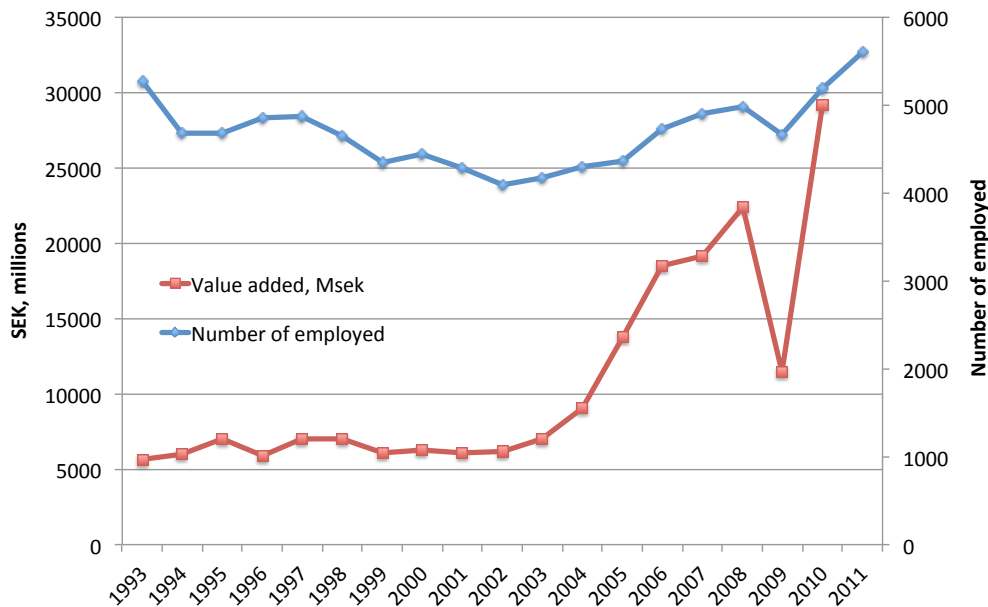
Policy interventions

- Scarcity of a resource is accounted for in the market price
 - No argument for a specific “resource tax” or “recycling subsidy”
 - If scarcity increases (due to an increase in demand for example), the price goes up, recycling becomes more profitable

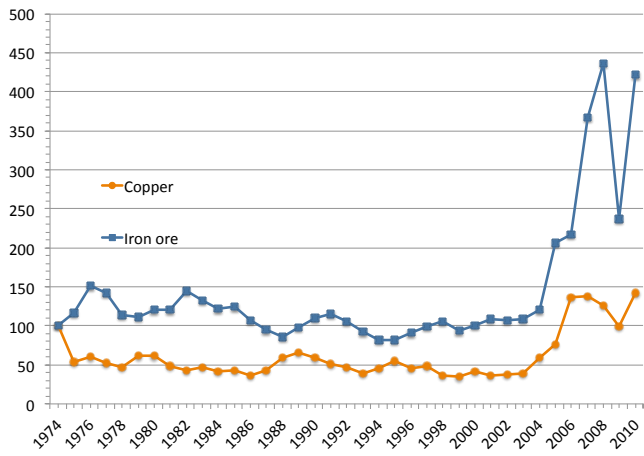
Increased recycling from Norrland's perspective?

- Extends and prolongs the resource base, contribute to a sustainable development
- Positive effects on employment in “recycling industries”
- Negative effect on the extraction industry, less jobs
- Some experience from the forest industry

Increased recycling from Norrland's perspective?



- Negative trend in metal prices until beginning of 21'st century
- Value added stable, but employment falling
- Increase in productivity, higher profits (as share of value added)
- Strong positive trend, and very high volatility in metal prices since then



- Have resulted in sharp increase, and volatility, in value added
- Have NOT influenced employment as much
- Shocks are mostly absorbed by changes in profits (resource rents which "leaks out" from the region)

Conclusions

- Norrlands is very “heavy” on natural resources
- The conventional way to measure welfare (GDP, GRP) is not correct. Is missing depreciation of natural capital, production of eco services, and environmental damage
- Recycling implies in principle a lower depreciation rate of natural capital (expands the resource base)
- A higher recycling rate may sustain income from natural resources

Conclusions

- Let the market do the work
 - If material is valuable, recycling and secondary material markets will develop spontaneously
 - To spur markets, provide infrastructure for recycling and material systems
- Policy should focus market failures
 - Regulate or price virgin materials that causes damage
 - Continue to develop efficient incentive schemes for waste disposal
 - Introduce mandatory “clean-up insurances” before allowing permits for resource extraction

Finally, what is the value of Norrland?

Remember the formula:

GreenNRP = GRP – capital depreciation – environmental damage + eco services

By taking the discounted sum over all future periods we get Norrlands wealth (W), or its present value as

$$W = \sum_{t=0}^{\infty} \text{GreenNRP}_t \cdot (1+r)^{-t} \approx \text{GreenNRP}_0 \cdot \frac{1}{r}$$

So...

... by plugging in the correct numbers we get...

$$W \approx (191 + 95 + 0.2 + 2.9 + 0.4) \cdot \frac{1}{0.03} = 9\,665 \text{ billion SEK}$$

how I really did come up with this is another story...

Thank's for your attention