

What happens if we treat commuting as intermediate consumption?

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Agenda

- GDP and welfare
- The special role of commuting
- Emission responsibility
- The Commuting Input-Output Table (CIOT)
- Next steps

GDP and Welfare

GDP is:

- The total value of all final goods and services produced by an economy
- The total value of all final goods and services used by an economy
- The total income attributed to labour and capital

What does this have to do with welfare?

GDP and Welfare



GDP and Welfare

Too much and for too long, we seem to have surrendered personal excellence and community value in the mere accumulation of material things. Our Gross National Product, now, is over eight hundred billion dollars a year, but that GNP [...] counts air pollution and cigarette advertising and ambulances to clear our highways of carnage. It counts special locks for our doors and the jails for the people who break them. It counts the destruction of the redwoods and the loss of our natural wonder in chaotic sprawl. It counts napalm and it counts nuclear warheads, and armored cars for the police to fight the riots in our cities.

Robert F. Kennedy, 1968

GDP and Welfare

Gross National Product does not allow for the health of our children, the quality of their education, or the joy of their play. It does not include the beauty of our poetry or the strength of our marriages, the intelligence of our public debate or the integrity of our public officials. It measures neither our wit nor our courage, neither our wisdom nor our learning, neither our compassion nor our devotion to our country; it measures everything, in short, except that which makes life worthwhile.

Robert F. Kennedy, 1968

GDP and Welfare

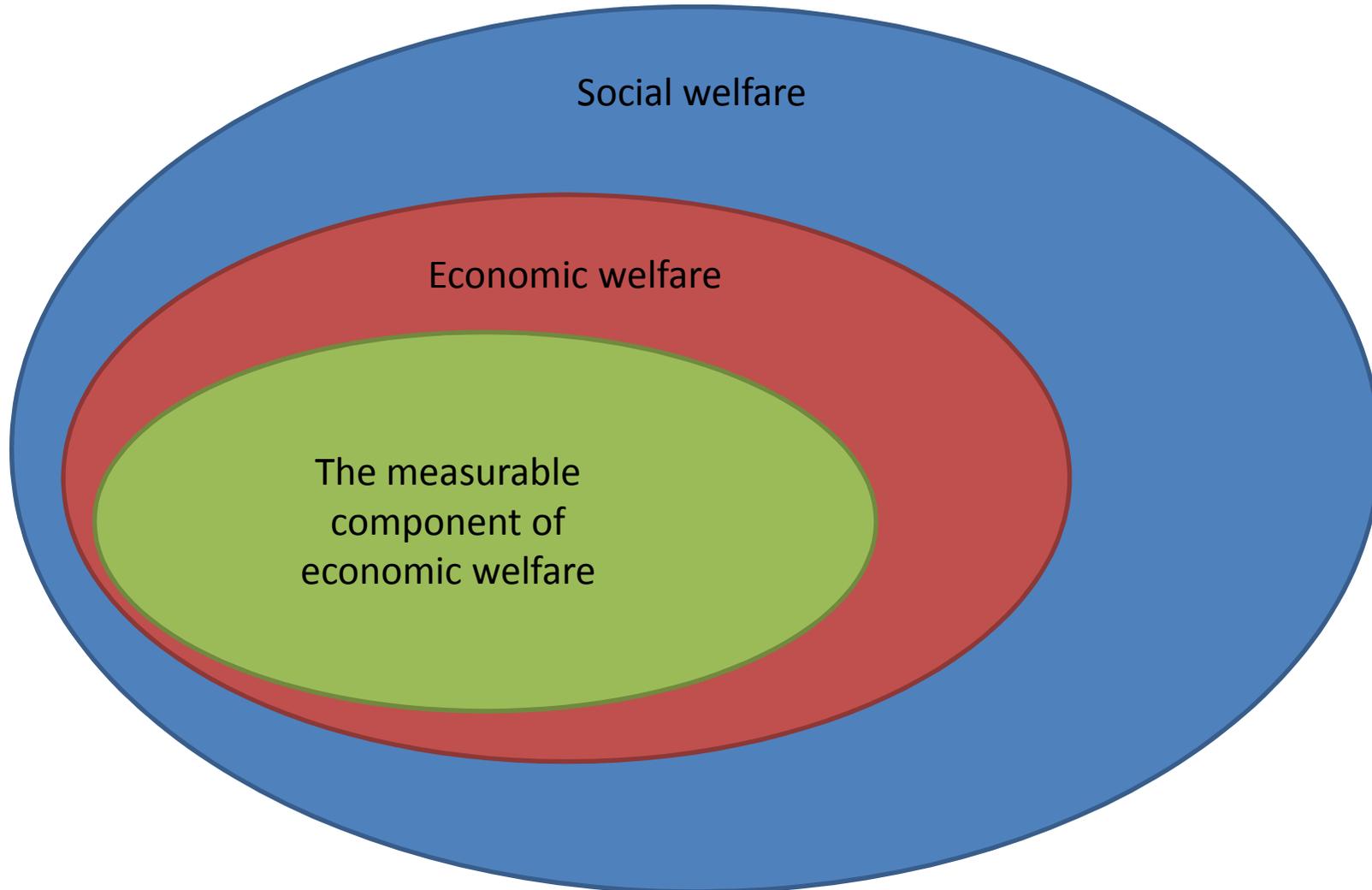
Pigou (1920): *The Economics of Welfare*

- **Welfare** is determined by the satisfaction or dissatisfaction of desires.
- **Economic welfare** is the “part of welfare” that can be measured in monetary terms.

Abramovitz (1959): *The Allocation of Economic Resources*

- GNP is supposed to be “the objective, measurable component of economic welfare”.
- “causes which affect economic welfare favorably may conceivably affect social welfare unfavorably”.

GDP and Welfare



GDP and Welfare

- Eisner (JEL, 1988): Total welfare is the sum of economic welfare and non-economic welfare.
 - Non-economic welfare is clearly hard to measure.
 - But we should at least try to measure economic welfare as accurately as possible.
- Abramovitz (1959):
 - We should distinguish “consistently between final goods and intermediate goods in a fashion which properly reflects the welfare goal of the index”.
 - “The normal procedure of assuming that consumer outlays made are made for final products, while business spending is either for capital goods or intermediate goods is unsatisfactory”.
- Where do we draw the line between final goods and intermediate goods?

The Special Role of Commuting

Time spent in minutes in a week day,
commuting respondents

| Country | Minutes |
|----------------|---------|
| Australia | 43 |
| United States | 79 |
| Japan | 82 |
| Germany | 66 |
| Spain | 65 |
| France | 62 |
| United Kingdom | 64 |

Source: [OECD](#)

- Environmental damage: Commuting accounts for roughly 8% of total GHG emissions in the UK (Jackson et al., 2006)
- Economic cost: Commuting expenditure was roughly 1.7% of U.S. GNP in 1977 (Zolotas, 1981).
- When the time loss is considered, that figure becomes 7.2% (Zolotas, 1981).

The Special Role of Commuting

Stutzer & Frey (2008): *Stress that Doesn't Pay: The Commuting Paradox*

The strain of commuting is associated with:

- raised blood pressure
- musculoskeletal disorders
- lowered frustration tolerance and increased anxiety and hostility
- being in a bad mood when arriving at work in the morning and coming home in the evening
- increased lateness, absenteeism and turnover at work
- adverse effects on cognitive performance

Road Rage



The Special Role of Commuting

- Commuting does not fulfil wants and desires, it does not increase satisfaction.
- This view is supported by existing legislation.
 - Commuting expenditure is tax-deductible in many countries.
 - There have been successful lawsuits which forced employers to treat commuting time as worktime.
- If GDP is supposed to measure (economic) welfare, we should not include commuting expenditure.
- Solution: treat commuting as intermediate consumption rather than final consumption
- What does this mean for our input-output tables?

The “regular” input-output table

| | fuel industry | transport industry | other industries | total interm. cons. | cons. | inv. | gov. | final cons. | total use |
|--------------------|---------------|--------------------|------------------|---------------------|-------|------|------|-------------|-----------|
| fuels | 5 | 50 | 50 | 105 | 80 | 0 | 15 | 95 | 200 |
| transport services | 5 | 10 | 50 | 65 | 90 | 0 | 45 | 135 | 200 |
| other products | 90 | 40 | 100 | 230 | 100 | 50 | 20 | 170 | 400 |
| (sub-)total | 100 | 100 | 200 | 400 | 270 | 50 | 80 | 400 | 800 |
| wages | 60 | 70 | 120 | 250 | | | | | |
| profits | 40 | 30 | 80 | 150 | | | | | |
| value added | 100 | 100 | 200 | 400 | | | | | |
| total supply | 200 | 200 | 400 | 800 | | | | | |
| GDP (exp.) | 400 | | | | | | | | |
| GDP (inc.) | 400 | | | | | | | | |

Intermediate consumption

Final consumption

Primary inputs

If we know commuting expenditure by product, we can do this:

| | fuel industry | transport industry | other industries | total interm. cons. | commuting | cons. (other than comm.) | inv. | gov. | final cons. | total use |
|--------------------|---------------|--------------------|------------------|---------------------|-----------|--------------------------|------|------|-------------|-----------|
| fuels | 5 | 50 | 50 | 105 | 40 | 40 | 0 | 15 | 95 | 200 |
| transport services | 5 | 10 | 50 | 65 | 45 | 45 | 0 | 45 | 135 | 200 |
| other products | 90 | 40 | 100 | 230 | 0 | 100 | 50 | 20 | 170 | 400 |
| (sub-)total | 100 | 100 | 200 | 400 | 85 | 185 | 50 | 80 | 400 | 800 |
| wages | 60 | 70 | 120 | 250 | | | | | | |
| profits | 40 | 30 | 80 | 150 | | | | | | |
| value added | 100 | 100 | 200 | 400 | | | | | | |
| total supply | 200 | 200 | 400 | 800 | | | | | | |
| GDP (exp.) | 400 | | | | | | | | | |
| GDP (inc.) | 400 | | | | | | | | | |

Intermediate consumption

Final consumption

Primary inputs

If we know commuting expenditure by industry, we can do this:

| | fuel industry | transport industry | other industries | total interm. cons. | commuting | cons. (other than comm.) | inv. | gov. | final cons. | total use |
|--------------------|---------------|--------------------|------------------|---------------------|-----------|--------------------------|------|------|-------------|-----------|
| fuels | 5 | 50 | 50 | 105 | 40 | 40 | 0 | 15 | 95 | 200 |
| transport services | 5 | 10 | 50 | 65 | 45 | 45 | 0 | 45 | 135 | 200 |
| other products | 90 | 40 | 100 | 230 | 0 | 100 | 50 | 20 | 170 | 400 |
| (sub-)total | 100 | 100 | 200 | 400 | 85 | 185 | 50 | 80 | 400 | 800 |
| wages | 40 | 50 | 75 | 165 | | | | | | |
| profits | 40 | 30 | 80 | 150 | | | | | | |
| commuting | 20 | 20 | 45 | 85 | | | | | | |
| value added | 100 | 100 | 200 | 400 | | | | | | |
| total supply | 200 | 200 | 400 | 800 | | | | | | |
| GDP (exp.) | 400 | | | | | | | | | |
| GDP (inc.) | 400 | | | | | | | | | |

Intermediate consumption

Final consumption

Primary inputs

The commuting input-output table (CIOT)

| | fuel industry | transport industry | other industries | commuting | total interm. cons. | cons. (other than comm.) | inv. | gov. | final cons. | total use |
|--------------------|---------------|--------------------|------------------|-----------|---------------------|--------------------------|------|------|-------------|-----------|
| fuels | 5 | 50 | 50 | 40 | 145 | 40 | 0 | 15 | 55 | 200 |
| transport services | 5 | 10 | 50 | 45 | 110 | 45 | 0 | 45 | 90 | 200 |
| other products | 90 | 40 | 100 | 0 | 230 | 100 | 50 | 20 | 170 | 400 |
| commuting | 20 | 20 | 45 | 0 | 85 | 0 | 0 | 0 | 0 | 85 |
| (sub-)total | 120 | 120 | 245 | 85 | 570 | 185 | 50 | 80 | 315 | 885 |
| wages | 40 | 50 | 75 | 0 | 165 | | | | | |
| profits | 40 | 30 | 80 | 0 | 150 | | | | | |
| value added | 80 | 80 | 155 | 0 | 315 | | | | | |
| total supply | 200 | 200 | 400 | 85 | 885 | | | | | |
| GDP (exp.) | 315 | | | | | | | | | |
| GDP (inc.) | 315 | | | | | | | | | |

Intermediate consumption

Final consumption

Primary inputs

Emission Responsibility

- In ecological economics, we want to know who is responsible for emissions of GHG etc.
- Consumer responsibility vs. producer responsibility
 - The goal is not to play a blame game.
 - The goal is to develop effective mitigation strategies.
- Environmentally extended input-output analysis (EEIOA) tells us which products are relatively “clean” and which are relatively “dirty”.
- But so far they do not consider the emissions generated by commuters.

Emission Responsibility

- Example:
 - I take my car, drive to the university, and deliver a lecture on microeconomics.
 - Who is responsible for the emissions?
- With a CIOT:
 - Commuting is allocated to industries, not consumers.
 - We can get a better picture of emission responsibility.
 - And we can develop more effective mitigation strategies.
- If firms were “responsible” for the emissions of their commuting employees, they would have incentives to reduce those emissions.
 - Organize car-pooling
 - Subsidize public transport tickets or e-mobility
 - Allow teleworking

Next Steps

- Data that we need:
 - Commuting expenditure by product
 - Commuting expenditure by industry
- Problems to be solved:
 - We know the consumption expenditure on fuels, vehicles, vehicle maintenance, transport services etc. But how much of this is for commuting and how much is for other purposes?
 - We need commuting expenditure by industry.