# Why not to choose the most convenient labor supply model? An analysis of the consequences of different labor supply modeling in economic policy analyses.

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# Labor supply in transport economics policy analysis

Urban/transport economists model labor supply in different ways:

1. **No decision on labor supply**
   - Leisure fixed (McDonald 2009, Wrede 2009)
   - Leisure depends on commuting time $\longrightarrow$ leisure as residual (Brueckner 2005, Rhee et al. 2014)
   - Labor supply depends on commuting time $\longrightarrow$ labor supply as residual (Lucas & Rossi-Hansberg, 2002)
2. **Endogenous labor supply**
   1. Endogenous working hours but exogenous workdays (Anas & Kim 1996, Anas & Xu, 1999, De Palma & Lindsay 2004)
   2. Endogenous workdays but exogenous working hours (Verhoef 2005, Arnott 2007, Tscharaktschiew & Hirte 2010a)

# Endogenous working hours

| | |
|---|---|
| Anas (2002) | Olwert and Guldmann (2012) |
| Anas and Kim (1996) | Parry and Small (2005) |
| Anas and Rhee (2006) | Parry and Bento (2002) |
| Anas and Xu (1999) | Van Ommeren and Fosgerau (2009) |
| De Borger and Wuyts (2011a) | Verhoef and Nijkamp (2002) |
| De Palma and Lindsey (2004) | West and Williams (2007) |
| Fujishima (2011) | White (1988) |
| Hotchkiss and White (1993) | White (1977) |

Spatial model (incorporating location decisions of households and/or firms)

# Endogenous working days

| | |
|---|---|
| Arnott (2007) | Lin and Prince (2009) |
| Berg (2007) | Parry and Bento (2001) |
| Calthrop (2001) | Parry (2011) |
| De Borger and Van Dender (2003) | Tscharaktschiew (2014) |
| De Borger and Wuyts (2009) | Tscharaktschiew and Hirte (2010) |
| De Borger and Wuyts (2011b) | Tscharaktschiew and Hirte (2012) |
| Fosgerau and Pilegaard (2007) | Van Dender (2003) |
| Hirte and Tscharaktschiew (2013a,b) | Verhoef (2005) |
| Spatial model (incorporating location decisions of households and/or firms) | |

# Labor or leisure as residual

| **Leisure as residual (sum of leisure + commuting time is fixed, labor fixed)** | |
|---|---|
| Anas and Hiramatsu (2012) | De Lara et al. (2013) |
| Anas and Hiramatsu (2013) | De Salvo (1977) |
| Anas and Liu (2013) | Kono et al. (2013) |
| Anas and Rhee (2007) | Kwon (2005) |
| Arnott et al. (2008) | Martin (2001) |
| Bento et al. (2006) | McDonald (2009) |
| Brock and Wrede (2005) | Parry (1995) |
| Borck and Wrede (2008) | Parry and Small (2009) |
| Borck and Wrede (2009) | Parry and Timilsina (2010) |
| Brueckner (2005) | Ross and Zenou (2009) |
| Brueckner (2007) | Sullivan (1983a,b) |
| Brueckner et al. (2002) | Rhee, Yu, Hirte (2014) |
| Calthrop et al. (2000) | Wrede (2001) |
| De Borger and Wouters (1998) | Wrede (2009) |
| **Labor as residual (sum of labor + commuting time is fixed, no leisure)** | |
| Lucas and Rossi-Hansberg (2002) | Rossi-Hansberg (2014) |
| Spatial model (incorporating location decisions of households and/or firms) | |

# Why labor supply modeling might matter?

## Question

**Are the effects of transportation policies robust to the modeling of labor supply?**

1. **Labor supply** is a decision variable of workers
   (in particular in the medium or long run; wage tax distortions)
2. **Fixed costs per day or week**: child care, commuting (Cogan 1981).
   $\rightarrow$ VOT of an additional hour on a workday
   $>$ VOT of an hour that implies to add another workday
3. **No. of workdays determines the number of commuting trips:**
   - **Tax distortions of travel related taxes** depend on the number of trips (e.g. congestion toll, cordon toll, fuel taxes, emission tax, miles tax, parking fees)
   - **Congestion** depends among others on the number of trips

# Which labor supply modeling fits empirics?

1. **Differentiating working**
   - **Hours per week and weeks**
     (Hanoch 1980, Blank 1988, Triest 1990, Heckman 1993)
   - **Hours per day and days**
     (Hammermesh 1996)
   - **Days per week, hours per day, weeks per year**
     (Dechter 2013)
   - **Participation vs. hours worked or workdays**
     (Heckman 1993, Blundell & MaCurdy 1999, Kleven & Kreiner 2006; Dechter 2013)
2. **Inhomogeneity of leisure**
   - **Leisure on workdays and leisure on leisure days**
     (Hanoch 1975, Oi 1976, Dechter 2013)
3. **Empirical research in transportation**:
   - Gutiérrez-i-Puigarnau & van Ommeren (2010)

# Research Question

## Question

**Are the effects of transportation policies robust to the modeling of labor supply?**

In particular, we

1. Suggest a **hybrid labor supply approach**:
   decision on workdays per year and daily workhours (see Hanoch, 1976)
2. **Derive and compare the VOTs** of the different approaches:
   'workhours'; 'workdays'; hybrid approach
3. **Derive welfare changes and optimal policies in an urban model**
4. **Run simulations** of several policies (congestion toll, cordon toll, miles tax, land-use type regulation, infrastructure expansion) to identify sign and size of various effects (e.g. welfare)

# Findings

- **Approach chosen matters** for signs and magnitude of welfare effects of tax instruments
- **Hybrid approach is less sensitive**
- **Days approach** approximates hybrid approach with homogeneous leisure
- **Hours approach** approximates hybrid approach with inhomogeneous leisure and labor tax recycling

# Theoretical Background

## General Setting

- City with 2 zones
- Mixed zones: working, living, shopping
- RUM approach (Anas & Xu 1999)
- Monetary + time costs of travelling (endogenous)

# Inhomogeneous hybrid approach

A household derives utility $u$ from consumption (shopping) $z$, housing $q$, and leisure

$$u = u(z, q, \mathcal{L}_1, \mathcal{L}_2)$$

- $z$ = consumption (shopping)
- $q$ = housing
- $\mathcal{L}_1 = \ell D$ = leisure on workdays
  ($\ell$ leisure hours per day, $D$ workdays)
- $\mathcal{L}_2 = lL$ = leisure on leisure days
  ($l$ leisure hours per leisure day, $L$ leisure days).

# Constraints

$$
\begin{aligned}
(w^n h - c)\, D + \mathcal{I} - (p + c^z)\, z - r^q q = 0 \quad & [\text{budget}, \lambda] \\
E - D - L = 0 \quad & [\text{days}, \gamma] \\
eD - (h + t)\, D - \ell D - \beta t^z z = 0 \quad & [\text{hours on workday}, \mu] \\
eL - lL - (1 - \beta)\, t^z z = 0 \quad & [\text{hours on leisure day}, \rho]
\end{aligned}
$$

- $E$ endowment of days per year,
- $e$ daily time endowment,
- $\beta$ share of shopping on workdays,
- $t^z$ shopping trip time
- $c$ monetary travel costs

# VOTs in different approaches

| | $u(z, q, ...)$ | VOTh: $\frac{\mu}{\lambda}$ | VOTl: $\frac{\rho}{\lambda}$ |
|---|---|---|---|
| *Hybrid_i* | $\mathcal{L}_1, \mathcal{L}_2$ | $w^n$ | $w^n - \frac{w^n t + c}{e}$ |
| *Hybrid_h* | $\mathcal{L}$ | $w^n$ | $w^n - \frac{w^n t + c}{e - \bar{\ell}}$ |
| *Hours_i* | $\mathcal{L}_1, \mathcal{L}_2$ | $w^n$ | $\frac{\rho}{\lambda}$ |
| *Hours_h* | $\mathcal{L}$ | $w^n$ | $w^n$ |
| *Days_i* | $\mathcal{L}_1, \mathcal{L}_2$ | $\frac{u_{\mathcal{L}_1}}{\lambda} = \frac{\mu}{\lambda}$ | $\frac{w^n \bar{h} - c}{e} + \frac{\mu}{\lambda}\frac{e - \bar{h} - t}{e}$ |
| *Days_h* | $\mathcal{L}$ | $\frac{w^n \bar{h} - c}{\bar{h} + t}$ | $\frac{w^n \bar{h} - c}{\bar{h} + t}$ |

- $VOTL = \frac{\gamma}{\lambda} = e\frac{\rho}{\lambda}$
- **Full consumer price (**LS-tax recycling, inhomogeneous leisure)

$$P = p + c^z + \left\{ \beta \frac{\mu}{\lambda} + (1 - \beta) \frac{\rho}{\gamma} \right\} t^z \tag{1}$$

# Closing the model

- Probability for residence-working location $(i, j)$ (MNL: Small & Rosen 1981)

$$\Psi_{ij} = \frac{\exp(\Lambda V_{ij})}{\sum_{a,b} \exp(\Lambda V_{ab})} \tag{2}$$

- Local output - representative firm (CRS); inputs labor and land

$$X_i = f(L_i, Q_i) \tag{3}$$

- Government budget ($s_i A_i$ = share of land used for infrastructure)

$$\tau^w T^w + \sum_i \tau_i^t T_i^t + \tau^{ls} N = \sum_i r_i s_i A_i \tag{4}$$

- Land market clearing

$$(1 - s_i) A_i = Q_i + N \sum_j \Psi ij q_{ij} \tag{5}$$

- Local labor and good markets clearing

# Welfare

**Welfare = expected value of maximized utilities**
(McFadden 1976, Small & Rosen 1981, Anas & Rhee 2006)

$$W = E\left[\max\left(V_{ij} + \varepsilon_{ij}\right)\right] = \frac{1}{\Lambda} \ln \sum_{i,j} \exp\left(\Lambda V_{ij}\right) \tag{6}$$

**Marginal welfare change** w.r.t. congestion toll $\tau_k^t$ in zone $k$,

$$\frac{1}{\lambda}\frac{dW}{d\tau_k^t} = \underbrace{\left(MEC_{lk}^t - \tau_k^t \frac{Adj_k^t}{dF/d\tau_k^t}\right)\left(-\frac{dF}{d\tau_k^t}\right)}_{\text{Pigouvian term}} + \underbrace{TI^t}_{\text{tax interaction}} + \underbrace{RE^t}_{\text{redistribution}}, \quad \forall i,$$

# Definitions

$$MEC^t \equiv \frac{N}{\lambda} \sum_i \sum_j \Psi_{ij} \lambda_{ij} D_{ij} \frac{dt_{ij} / d\tau_k^t}{dF / d\tau_k^t}$$

$$\frac{dF}{d\tau_k^t} = N \sum_{i,j} \left( \Psi_{ij} \frac{dD_{ij}}{d\tau_k^t} + D_{ij} \frac{d\Psi_{ij}}{d\tau_k^t} \right) + N \sum_j \sum_{j \neq i} \left( \Psi_{ji} \frac{dD_{ji}}{d\tau_k^t} + D_{ji} \frac{d\Psi_{ji}}{d\tau_k^t} \right)$$

$$TI^t \equiv \tau^w N \sum_{i,j} \left( \Psi_{ij} w_j h_{ij} \frac{dD_{ij}}{d\tau_k^t} + \Psi_{ij} w_j D_{ij} \frac{dh_{ij}}{d\tau_k^t} + w_j h_{ij} D_{ij} \frac{d\Psi_{ij}}{d\tau_k^t} \right)$$
$$+ N \sum_{i \neq k} \tau_i^t \left[ \sum_j \left( \Psi_{ij} \frac{dD_{ij}}{d\tau_k^t} + D_{ij} \frac{d\Psi_{ij}}{d\tau_k^t} \right) + N \sum_{j \neq i} \left( \Psi_{ji} \frac{dD_{ji}}{d\tau^k} + D_{ji} \frac{d\Psi_{ji}}{d\tau^k} \right) \right]$$

$$RE^t \equiv MEC^t \frac{dF}{d\tau_k^t} \left( \phi^E - 1 \right) + Y^t \left( \phi^Y - 1 \right) - N \sum_{i,j} \Psi_{ij} \delta^k D_{ij} \left( \phi^T - 1 \right)$$

# Relocation and workdays

**Remark**

*In a* **workhours** *approach the welfare effects of Pigouvian congestion tolls are only determined by relocation and changes in daily working hours.*

**Remark**

*With prohibiting spatial relocation costs (no relocation) the Pigouvian term is zero (no Pigouvian toll) in the* **workhours approach**. *Congestion tolls only affect the tax interaction effects.*

Hence, in non-spatial approaches workdays and workhours approach will differ strongly.

# Optimal congestion toll

The **optimal congestion toll** in zone $k$ :

$$\left(\tau_k^t\right)^* = \underbrace{\frac{MEC^t}{Adj^t}\left(-\frac{dF}{d\tau_i^t}\right)}_{(+)} + \underbrace{\frac{TI^t}{Adj^t}}_{(-)} + \underbrace{\frac{RE^t}{Adj^t}}_{(?)}. \tag{7}$$

No clear result $\longrightarrow$ simulations

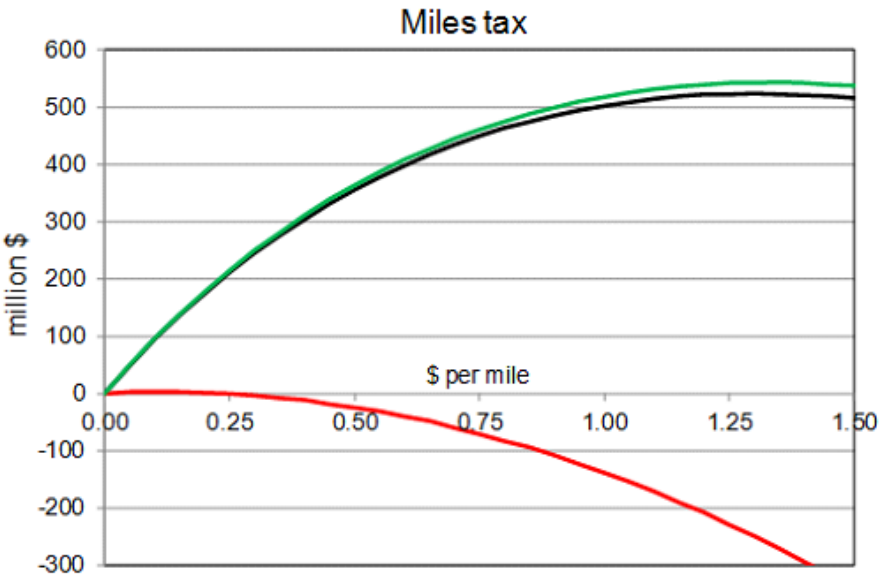
# Spatial CGE Policy Analyses - Benchmark

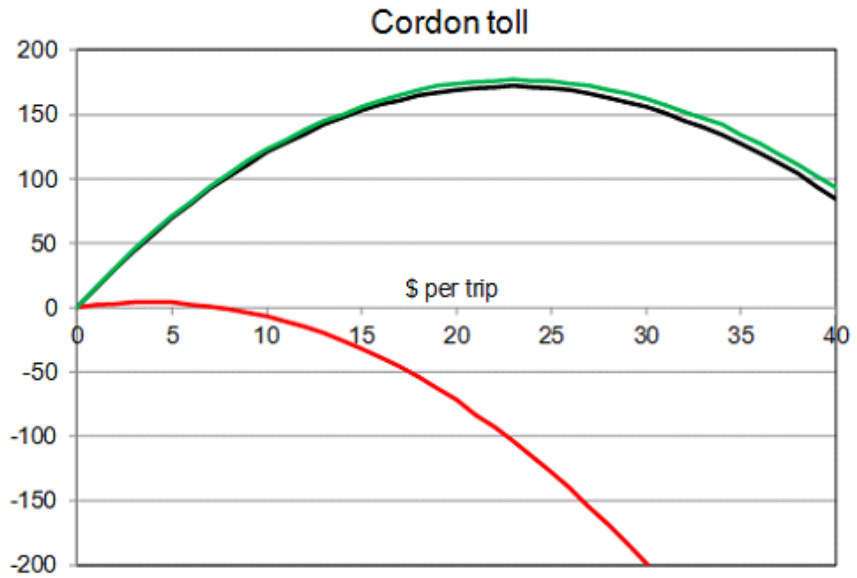
- Anas & Rhee (2006)
- BPR congestion function
- CD utility, CES subutility, CD production
- Balance of payment (absentee landlords, transportation costs)
- Calibration to 'average' U.S. MSA
  - 500,000 households
  - Average commuting time 31 minutes per one-way trip
  - 31 hours total annual time delay
  - 22 cpm average marginal external costs
- 180 simulations (5 policies, 36 simulations each)

# Results: tax policies - Equivalent Variations

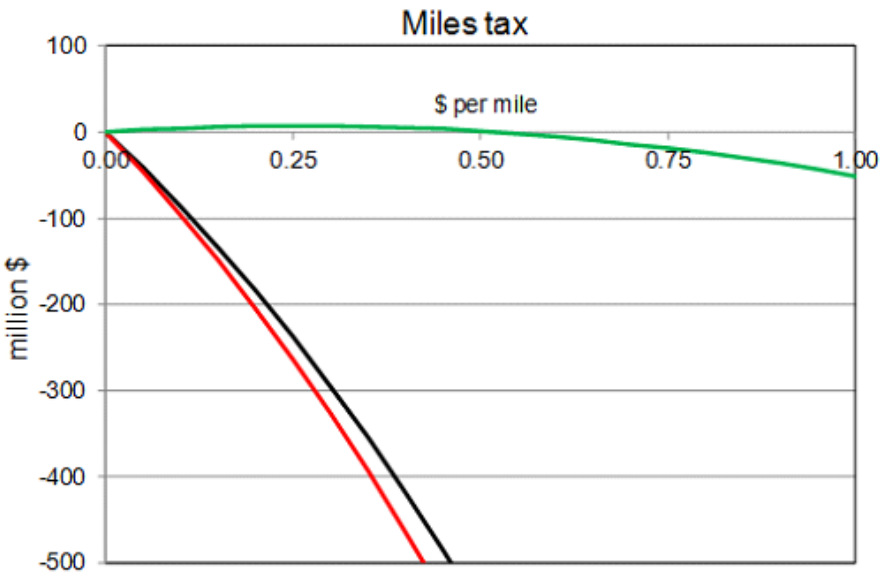
| | | | | Inhomogeneous | | | | Homogeneous | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Policy** | **Recycl** | **Land** | no. | **h** | **hyb** | **D** | no | **h** | **hyb** | **D** |
| 1 | Pigou | LS | Mix | 1a | 43 | 16 | -17 | 6a | 30 | -107 | -109 |
| 2 | Pigou | LS | Abs | 1b | 56 | 26 | -17 | 6b | 76 | -140 | -155 |
| 3 | Pigou | LS | Urb | 1c | 17 | 4 | -10 | 6c | 2 | -15 | -16 |
| 4 | Pigou | Labor | Mix | 1d | 202 | 199 | 13 | 6d | 177 | 20 | 4 |
| 5 | Pigou | Labor | Abs | 1e | 217 | 215 | 16 | 6e | 325 | 63 | 24 |
| 6 | Pigou | Labor | Urb | 1f | 127 | 122 | 5 | 6f | 15 | 1 | -1 |
| 13 | Miles | LS | Mix | 3a | 4 | -4 | -6 | 8a | 3 | -41 | -46 |
| 14 | Miles | LS | Abs | 3b | 6 | -2 | -5 | 8b | 5 | -33 | -40 |
| 15 | Miles | LS | Urb | 3c | 1 | -3 | -6 | 8c | 1 | -40 | -45 |
| 16 | Miles | Labor | Mix | 3d | 50 | 49 | 2 | 8d | 53 | 3 | 0 |
| 17 | Miles | Labor | Abs | 3e | 47 | 46 | 3 | 8e | 58 | 7 | 3 |
| 18 | Miles | Labor | Urb | 3f | 46 | 45 | 1 | 8f | 32 | -1 | -2 |
| 19 | Cordon | LS | Mix | 4a | 9 | -11 | -27 | 9a | 3 | -122 | -143 |
| 20 | Cordon | LS | Abs | 4b | 12 | -7 | -27 | 9b | 14 | -91 | -121 |
| 21 | Cordon | LS | Urb | 4c | 2 | -12 | -24 | 9c | 1 | -126 | -149 |
| 22 | Cordon | Labor | Mix | 4d | 123 | 121 | -7 | 9d | 128 | 3 | -19 |
| 23 | Cordon | Labor | Abs | 4e | 115 | 111 | -7 | 9e | 140 | 12 | -12 |
| 24 | Cordon | Labor | Urb | 4f | 113 | 109 | -8 | 9f | 81 | -18 | -31 |

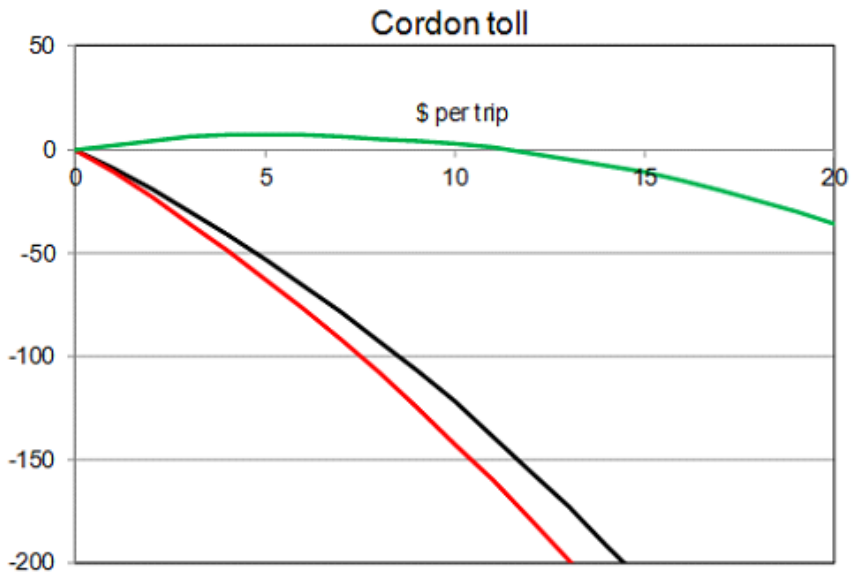
***Inhomogeneous leisure – labor tax recycling***




***Homogeneous leisure – lump-sum tax recycling***



# Findings

1. **In 50% of the simulations the welfare sign varies across approaches**
2. **Labor tax recycling** provides higher benefits than **lump sum tax recycling** (reason: tax recycling effects)
3. With **homogeneous leisure** + labor tax recycling: EV in hybrid and workhours are very similar
4. With **inhomogeneous leisure** + lump sum tax: EV in hybrid and workdays are very similar
5. **No differences w.r.t to planning or capacity expansion**

# Findings (contd.)

- **Planning instruments: LUR**
  - LUR and road capacity expansion: all approaches are similar (no direct effect of policy on the VOT)
  - With land-use type regulation the land market distortion effect does not depend directly on labor supply

$$\frac{1}{\lambda}\frac{dW}{d\zeta_k} = MEC_{\zeta k}\left(-\frac{dF}{d\zeta_k}\right) + TI_{\zeta k} + N\sum_i \left(r_i^q - r_i^Q\right)(1-s_i)\,A_i + RE_{\zeta k}.$$

- **Congestion:** all approaches provide very similar results concerning congestion
- **Land use:** stronger resorting with workhours and hybrid approach.

# Application: Parry and Small (2005, AER)

- Optimal fuel tax in the U.S. and U.K.

$$u\left(\varphi\left(Z, M, tM\right), \mathcal{L}_1 + \mathcal{L}_2\right) \rightarrow u\left(\varphi\left(Z, M, tM\right), mD, tmD, \mathcal{L}_1, \mathcal{L}_2\right)$$

- Miles and travel time $M$, $tM$ chosen like goods
- We add
  - commuting miles and travel time $mD$, $tmD$
  - inhomogeneous leisure + workdays + working hours

# Application: Parry and Small (2005, AER) – ctd.

$$\tau^F = \frac{MEC}{1 + MEB_H} \qquad \text{Adj. Pigouvian tax}$$

$$+ \frac{(1 - \eta_{M^o})\, \varepsilon^c_{HH}}{\varepsilon_{FF}} \frac{\tau^H p^F}{1 - \tau^H} \qquad \text{Ramsey term: non-commuting travel (PS, 2005)}$$

$$+ \underbrace{\left[ \frac{\varepsilon^c_{DH} + \eta_H}{\varepsilon_{FF}} + \frac{\left[\varepsilon_{HH} - (1 - \eta_M)\, \varepsilon^c_{HH}\right]}{\varepsilon_{FF}} \frac{t_L M_L}{eD} \right] \frac{mD}{M} \frac{\tau^H\, p^F}{1 - \tau^H}}_{\text{Ramsey term: labor supply .- days} \rightarrow \text{commuting}}$$

- $MEC$ marginal external costs of transport;
- $MEB_H$ marginal excess burden of income taxation
- $\eta$ income elasticities
- $\varepsilon_{HH}$ elasticity annual hours $H$ w.r.t. the net wage
- $\varepsilon_{DH}$ elasticiy of days w.r.t the net wage
- $\varepsilon_{FF}$ elasticity of fuel consumption w.r.t the fuel tax

# Application: Parry and Small (2005) - simulations

| | | PSI 2005 | Hirte/Tscharaktschiew 2015 | | |
|---|---|---|---|---|---|
| | | | $\varepsilon_{DH} = 0.06$ | $\varepsilon_{DH} = 0.2$ | $\varepsilon_{DH} = 0.5$ |
| $(\tau^F)^*$ | | **99.6** | **103.68** | **113.75** | **138.6** |
| Adj.Pigou | | 74.3 | 74.7 | 75.9 | 78.7 |
| Ramsey | | 25.3 | 29.2 | 37.8 | 60.0 |
| | Ramsey 1 | 25.3 | 25.8 | 27.1 | 30.1 |
| | Ramsey 2 | | 3.1 | 10.8 | 29.9 |

Table: Table Caption

- No congestion feedback (about 1.5%)

# Conclusions

- **Labor supply approaches matters w.r.t. to welfare** (sign + magnitude) of economic instruments
- It does hardly matter w.r.t. congestion or commuting levels
- **Recommendations**:
  1. **General: Hybrid approach should be preferred**
  2. **Planning instruments + economic instruments** (inhomogeneity + LS tax recycling): approach doesn't matter
  3. **Economic instruments + homogeneity + LS/wage tax recycling** Workdays is good approximation to hybrid; workhours not
  4. **Economic instruments + inhomogeneity + wage tax recycling** Workhours is a good approximation to hybrid; workdays not
- There is a need for empirical research and better data

# Thanks for your attention!

# Value of times (VOTs) - inhomogeneous hybrid approach

- **VOTh (hour on a workday)**

$$\frac{\mu}{\lambda} = w^n \tag{8}$$

- **VOTL (leisure day)**

$$\frac{\gamma}{\lambda} = e\frac{\rho}{\gamma} = w^n\left(e - t\right) - c \tag{9}$$

- **VOTl (hour on leisure day)**

$$\frac{\rho}{\gamma} = \frac{\gamma}{\lambda}\frac{1}{e} = w^n - \frac{w^n t + c}{e} \tag{10}$$

- **Full consumer price (**LS-tax recycling, inhomogeneous leisure)

$$P = p + c^z + \left\{\beta\frac{\mu}{\lambda} + \left(1 - \beta\right)\frac{\rho}{\gamma}\right\} t^z \tag{11}$$

# Results (1a): city, tax, location

| **Pigouvian congestion toll - 1a** | Benchm | Hours | Hybrid | Days |
|---|---|---|---|---|
| **Households** | | | | |
| (23) Gross income [$] | 61,071 | −460 | −632 | −1,136 |
| (24) Consumption [trips] | 472 | 0 | −1 | −2 |
| (25) Av. housing [sqr feet] | 7778 | −55 | −58 | −77 |
| **Urban Economy** | | | | |
| (27) Urban GDP [bill $/year] | 29.1 | −0.2 | −0.3 | −0.5 |
| (28) EV [million $/year] | – | +43 | +16 | −17 |
| (29) Rent city/suburb | 5.95/2.22 | +0.12/−0.05 | +0.09/−0.05 | +0.08/−0 |
| (30) Wage rate city/sub [$/hour] | 22.81/19.65 | −0.05/−0.39 | −0.04/−0.36 | −0.04/−0 |
| **Government** | | | | |
| (31) Labor tax rev [mill $/year] | 8171 | −65 | −87 | −155 |
| (32) LS tax rev. [mill $/year] | –974 | −817 | −804 | −791 |
| (33) Congest toll rev. [mill $/year] | 0 | +897 | +880 | +890 |
| (34) Infrastr costs [mill $/year] | 7197 | +15 | −13 | −56 |
| **Location** | | | | |
| (35) Households – city | 168,687 | +3,745 | +3,687 | +2,882 |
| (37) Jobs – city | 268,099 | −6,356 | −6,313 | −4,971 |

# Results (1a): Labor, travel, Pigouvian tolls

| Pigouvian congestion toll - 1a | Benchm | Hours | Hybrid | Days |
|---|---|---|---|---|
| **Time allocation** | | | | |
| (1) Workdays per year | 263 | 0 | −1 | −1 |
| (3) Hours on a workday spent working/leisure | 8.3/5.8/ | 0/0 | +0.1/0 | 0/+0.1 |
| (6) Total labor supply [hours/year] | 2187 | +6 | −2 | −6 |
| (7) Total leisure demand [hours/year] | 2164 | +3 | +12 | +17 |
| (8) Total commuting time on workdays | 272 | −6 | −8 | −7 |
| (9) Total shopping time [hours/year] | 417 | −3 | −3 | −4 |
| **Travel/Transport/Traffic** | | | | |
| (10) Travel time delay [hours/year] | 31 | −5 | −5 | −5 |
| (11) MECC [$-cents/mile] | 22 | −3 | −4 | −3 |
| (12) Total travel time [hours/year] | 689 | −9 | −10 | −11 |
| **Pigouvian congestion toll** | | | | |
| (19) Congestion toll [$/trip] city–city | 0.0 | 1.54 | 1.51 | 1.50 |
| (20) Congestion toll [$/trip] city–sub | 0.0 | 0.16 | 0.15 | 0.14 |
| (21) Congestion toll [$/trip] sub–city | 0.0 | 7.33 | 7.22 | 7.35 |
| (22) Congestion toll [$/trip] sub–sub | 0.0 | 2.13 | 2.09 | 2.04 |

# Results: land use + road capacity expansion: EV

| | | | | Inhomogeneous | | | | Homogeneous | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Policy** | **Tax** | **Land** | no | *h* | hyb | *D* | no | *h* | hyb | *D* |
| 7 | Road | LS | Mix | 2a | -499 | -476 | -633 | 7a | -521 | -494 | -507 |
| 8 | Road | LS | Abs | 2b | -420 | -384 | -589 | 7b | -368 | -350 | -385 |
| 9 | Road | LS | Urb | 2c | -732 | -730 | -748 | 7c | -808 | -764 | -755 |
| 10 | Road | Lab | Mix | 2d | -706 | -709 | -669 | 7d | -757 | -699 | -715 |
| 11 | Road | Lab | Abs | 2e | -580 | -571 | -620 | 7e | -552 | -494 | -535 |
| 12 | Road | Lab | Urb | 2f | -1038 | -1047 | -785 | 7f | -1139 | -1079 | -107 |
| 25 | LUR | LS | Mix | 5a | -16 | -6 | -74 | 10a | -54 | -12 | -57 |
| 26 | LUR | LS | Abs | 5b | 8 | 20 | -38 | 10b | 30 | 63 | -9 |
| 27 | LUR | LS | Urb | 5c | -206 | -207 | -195 | 10c | -201 | -202 | -198 |
| 28 | LUR | Lab | Mix | 5d | -121 | -125 | -91 | 10d | -104 | -125 | -102 |
| 29 | LUR | Lab | Abs | 5e | -61 | -46 | -65 | 10e | -66 | -44 | -69 |
| 30 | LUR | Lab | Urb | 5f | -647 | -660 | -242 | 10f | -667 | -670 | -533 |