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Presentation to the LTA June 2004

The best of both worlds? Integrating the vehicle quota with road usage pricing

Outline

1. Motivation and background
2. A way to shift to usage charging without losing ownership control
3. Some possible specifics
4. Brief evaluation

1. MOTIVATION AND BACKGROUND

- Singapore's ownership control did well, but...
  - Blunt tool
  - Conflict with usage restraint
- Hence policy is to shift to usage restraint

Archives and Oral History Department Singapore

Current policy direction

- Reduce fixed costs
  - Ease quota ⇒ cheaper COEs
  - Reduce ARF, excise duty
- Put more faith in usage restraint
  - Parking prices
  - More ERP, higher ERP
  - Future fully variable ERP

Problems with current policy direction

- Phase in problem
- How high will ERP/parking go?
- Equity
- Lose a policy lever
  - To lower the fixed costs → must ease quota
    - → faster motorisation
    - → higher VKT
- Even so, fixed taxes still significant

Variabilisation & usage-based charging

- International interest in shifting costs from fixed to variable
  - Road pricing & congestion charging
  - Distance-based insurance (debate in Nth America)
  - Variabilise fixed taxes (European efforts)
  - Mass-distance fees (Heavy vehicles in Switzerland)
  - Car sharing business (proliferating globally)
  - Distance-based car leasing (US trial)
  - Tradeable usage permits (academic proposal)

Which vehicle fees best match total marginal vehicle costs?

Adapted from Litman (1999)

Rank	General Category
Best	**Time & location-specific road and parking pricing**
Second Best	**Distance-based pricing**
Third Best	**Fuel charges**
Blunt	**Fixed vehicle charges**
Worst	External & infrastructure costs not charged to motorists

Usage restraint as ownership restraint?

- Fixed costs
  - ownership restraint only
- Usage costs
  - usage restraint
  - some ownership restraint

especially where alternatives excellent

2. A WAY TO SHIFT TO USAGE RESTRAINT WITHOUT LOSING OWNERSHIP CONTROL?

- Can we make COE (and other fixed taxes) usage based yet also keep the Vehicle Quota System (VQS)?

- "Uniquely Singaporean" opportunity if feasible
- Can we variabilise the COE in a way that is compatible with bidding exercises?
- Which measure of usage as the basis for charging?
- Is monitoring this usage feasible?

Make the COE usage-based AND compatible with VQS bidding

- Convert 10-year limit to a USAGE LIMIT
  - COE variabilised
  - Equivalent to fee per unit of usage
    (eg per unit of fuel used or per km)
  - COE still lump sum and compatible with bidding exercises
  - Usage limits on other fixed vehicle taxes too, to variabilise them at the same time

What kind of usage for the usage limits?

- Key possibilities:
  - Fuel
  - Distance
  - Road pricing (various externalities)
- For each we would need to consider:
  - How well they match marginal costs
  - Feasibility of monitoring system
  - Implications for ERP system

Fuel-use limited COEs?

- eg COE gives right to buy 5,000 litres say
- Smart card or paper records:
  - so fuel sold only if remaining COE allowance
  - to deduct fuel purchase from allowance
- Complications:
  - Fuel use only part of usage externalities
  - Alternative fuels? Electric vehicles?
  - Fraud?
  - Boundary problems
  - Likely addition to fuel cost is high

Distance-limited COEs?

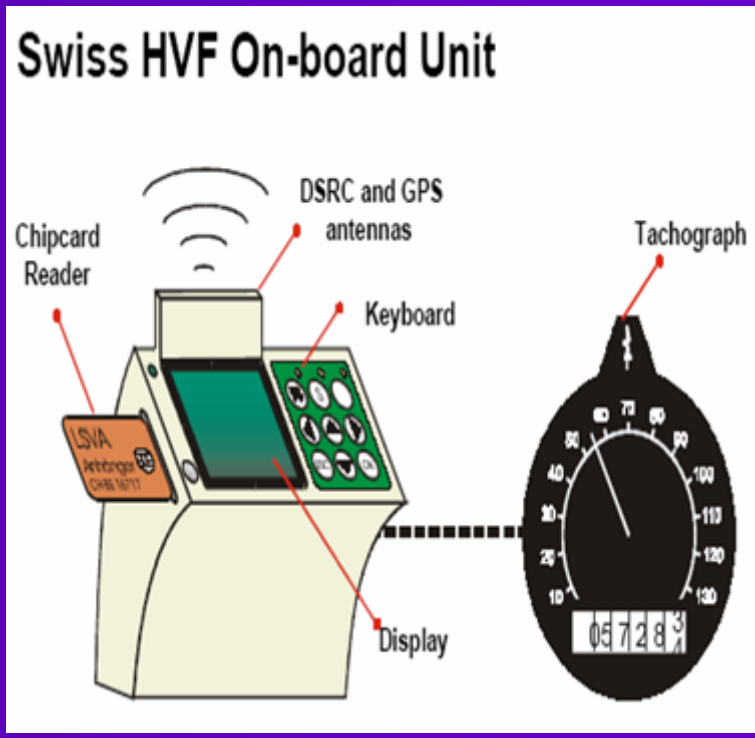
- eg COE allows car to be driven 25,000 km say
- Would make the COE equivalent to a flat distance charge
- Requires fraud-resistant method to measure distance driven and deduct from COE allowance

Monitoring possibilities for distance-limited COEs

- Odometers (with audits)?
  - Litman argues yes... but untested
- GPS alone?
  - not guaranteed available, can be interrupted
  - German problems
- Swiss Heavy Vehicle Fee (HVF)
  - Signal from tachograph
  - GPS as calibration & back-up
  - Working well since 2001

More on the Swiss HVF

- 55,000 units fitted (all Swiss trucks ++)
- Distance charge = distance X authorised weight X tariff based on emission rate
- Also point charges for specific roads (potentially compatible with ERP)
- Standard 34t truck: $0.47 / km
- Total system costs: 5-7% of revenue



Source: Presentation by Matthias Rapp at Transportation Finance Summit, 2004

Road-pricing as the usage limit basis?

- COE usage limit expressed as a “distance” (eg 25,000 “km”)
- Each road link at each time has an “impact factor” (instead of road pricing price)
- Impact factor determines how fast COE distance runs down when a vehicle travels on that link
  - eg rush hour radial road impact factor >~ 5
  - eg ordinary urban off-peak impact factor ~ 1
  - eg in Malaysia impact factor ~ 0.05 or maybe 0

So VQS and road pricing can actually be integrated

- Remaining COE distance (in km and/or $) displayed on IVU
- Technical implementation much like other positioning-based road pricing proposals
- Calculations could be internal to IVU to allay privacy concerns
- Road-side information for drivers could be very simple – just the current impact factor

3. POSSIBLE SPECIFICS

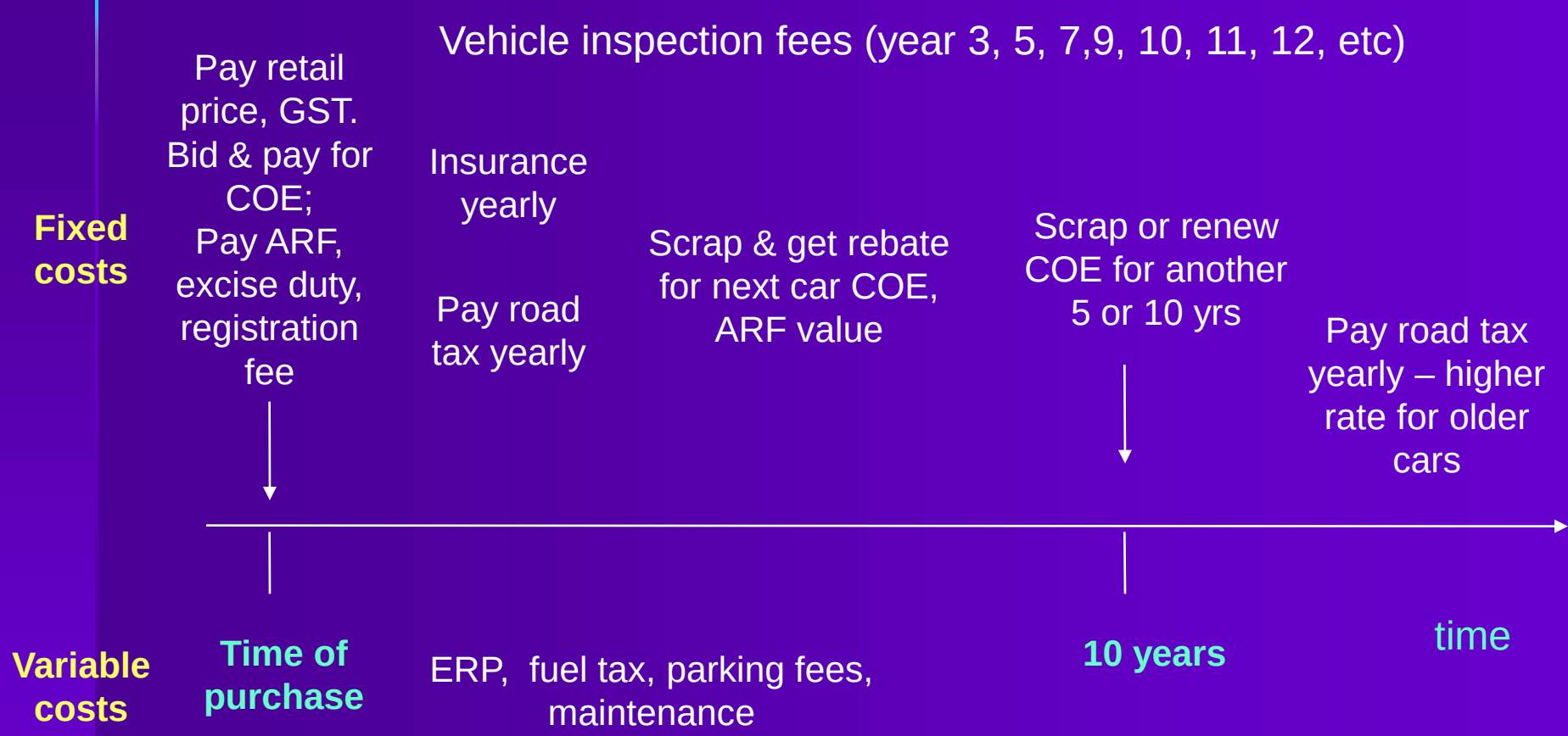
- Usage limit for all fixed vehicle taxes
- Different limit for each COE category (and taxis)
- Set other taxes so ‘roughly’ cost neutral (or lower) for typical vehicle in each category

Photo by Henry Yeung

Choice of usage limit

- Problems with both long limits (eg 10 year equivalent) and very short limits (<1 year equivalent)
- Intermediate limit (1 to 2 year equivalent)
  - Familiar, compatible with VQS
  - Clear usage-based incentives but no need for rebate system
  - Price changes felt relatively quickly but not too quickly

Existing vehicle tax system



After variabilising fixed taxes (intermediate distance-limit, car example)

An idea of prices

- Rough estimate for Toyota Corolla 1.6
  - about $7,500 tax for 25,000 km
  - about $0.30 per km
  - new purchase cost = about $37,500
  - lower if quota relaxed, higher if demand for cars rises
- Higher rate per km for top-end cars due to ARF, ED

4. BRIEF EVALUATION

- Don’t compare with status quo
- Compare with the existing methods of shifting towards usage based charging

Phase-in advantages

- Fair to vehicles on old system during phase-in
  - they face roughly status quo usage prices (eg ERP)
  - resale value probably little effected
- So faster phase in possible compared with existing policy
- Shift to usage basis of vehicle charges more complete than with existing policy

Greater policy choice: ownership control retained

- Existing policy:
  - Lose choices in use of VQS
  - No choice but to relax quota to make COE prices drop
- This proposal:
  - Shift to usage-restraint is independent of vehicle numbers policy

Benefits of retaining ownership control during transition

- Offers the potential to REDUCE traffic initially (or at least prevent an increase)
- In other words, a ‘traffic dividend’ is possible (unlike with existing policy)
- Which provides opportunities for environmental & pedestrian realm improvements

Spin-offs from reliable distance measurement

- Eliminate odometer fraud
- Distance-based insurance reform
- Distance importance in depreciation
- Distance-basis in vehicle leasing
- Statutory time limits (buses, taxis, trucks) → statutory distance limits?

Key options for VQS & ERP combinations

	Existing Technology only	*New distance-monitoring technology (existing ERP, new IVUs)*	*New positioning-based ERP technology*
Ownership control retained	**Status Quo**	Distance-limited taxes, existing ERP system (eg using Swiss HVF technology)	Road-pricing weighted distance-limited taxes (fully integrates VQS with positioning-based ERP)
Ownership control all but lost	Existing policy direction: relax quota, rely more on ERP, etc		Positioning-based ERP (announced likely future)

Summary of key points

- Usage limits are a neat way to variabilise COE yet be compatible with VQS bidding
- Monitoring usage is technically feasible (for variabilising based on fuel, distance or road pricing)
- So CAN variabilise all fixed vehicle taxes yet have continued control of vehicle numbers
- Lower fixed costs do not need higher VKT
- The useful aspects of COE, ARF, etc can be retained while eliminating their most problematic aspects ... “best of both worlds”

Conclusion

- VQS and comprehensive road pricing can actually be integrated!
- Can apparently achieve key goals of existing policy without key drawbacks
- Changes our perspective on vehicle tax and ERP reform options
- More detailed investigation required

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Thank you very much

‘Spending traffic dividend’ 3 choices

Bus Rapid Transit in Taipei

1. VQS tight, do nothing else
   → traffic dividend goes to existing motorists
2. Expand quota
   → traffic dividend goes to new motorists
3. VQS tight AND make space for alternatives
   → traffic dividend goes to better accessibility & environmental quality

- Suggestion:
  - **Initially relatively tight quota**
  - **Use space gained to improve alternatives**
  - **Relax quota when alternatives in place**

Netherlands km charge

- Proposed variabilisation of all fixed taxes → km charge (about S$0.15/km)
- Revenue neutral
- Studies: Reduce car km by >10%
- “Mobimeter” technology not decided
- Planned for 2004 start but cancelled after change of government (2002)

What about foreign vehicles?

Distance-based foreign vehicle charging?

- Charge same per km as equivalent Singapore vehicles
- Odometer sightings at border
- May be seen as fairer
- Tourism, culture industry benefits?
- IVUs compulsory for frequent visitors

External exemption with Swiss HVF uses DSRC gantries

- Gantry (5.8 GHz DSRC) tells vehicles to switch to “km counting off”
- Suggests we could automate switch to external rate

Source: Presentation by Matthias Rapp at Transportation Finance Summit, 2004