

OPTIONS FOR NATIONAL OIL EMERGENCY RESPONSE PLANS

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COPING WITH OIL EMERGENCIES

- Many studies have addressed coping with oil crises
- Recommendations include increased vehicle fuel efficiency, electric & hybrid vehicles, expansion of RR & mass transit, redesign of cities/“smart growth” policies, alternative fuel programs, CTL, GTL, EOR, etc.
- However, all of these will take decades to implement
- **Real problem**, rarely addressed: **What can be done if oil shortages occur in very near future** -- next week, next month, next yr. – or 5 yrs.
- **No contingency plans exist**
- We here assess available emergency options



LIQUID FUEL CONCERNS: BASICS

- In next 5 years, world oil production will begin to decline; shortages will worsen until mitigation takes hold
- Oil production correlates with GDP, so deepening shortages worldwide mean deepening economic distress
- There will be no quick fixes. Even crash program mitigation will take more than a decade to impact
- “Oil is energy but all energy is not oil”
- Societal priorities will change dramatically
Compromises will be required. Years of energy hopes & fantasy will yield to energy pragmatism.

THE IMPENDING WORLD ENERGY MESS

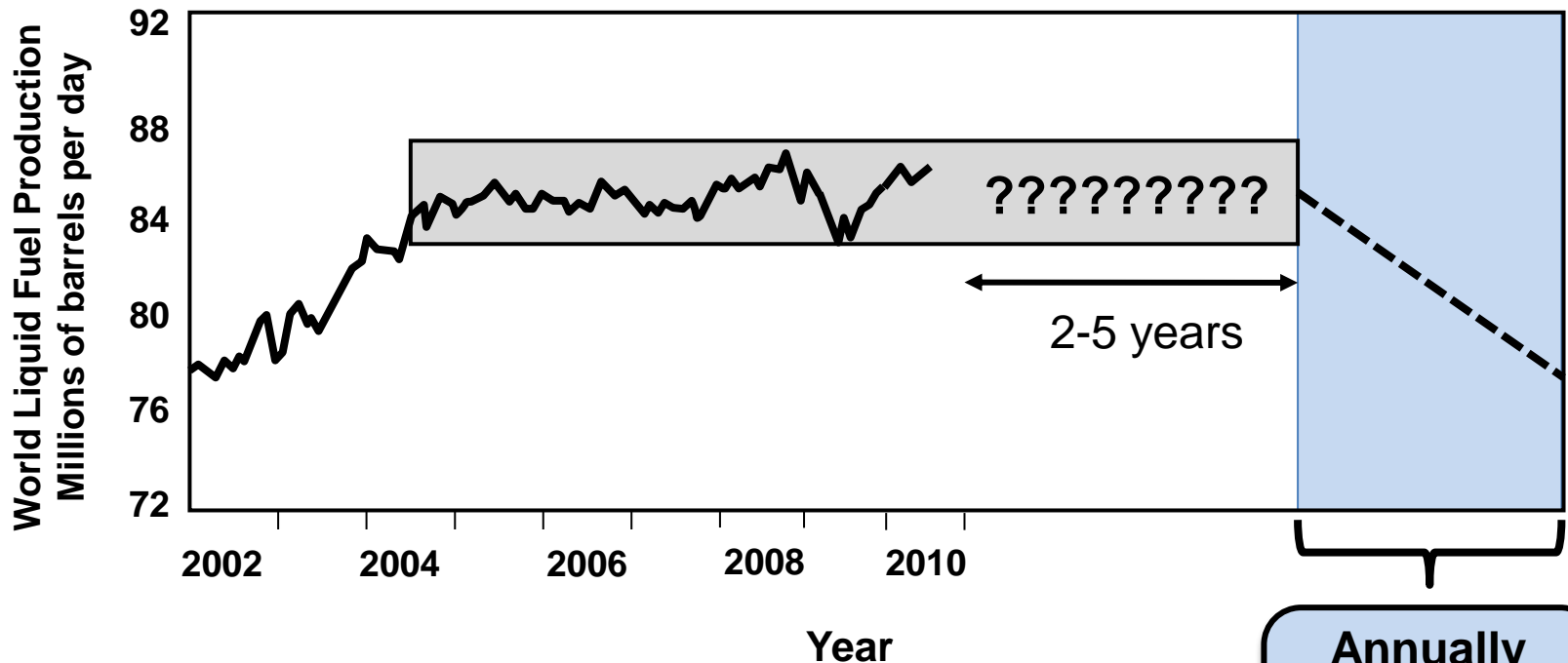
What It Is And What
It Means To YOU!



ROBERT L. HIRSCH
ROGER H. BEZDEK
ROBERT M. WENDLING

THE PRODUCTION PLATEAU

World oil production will stay on its current plateau & enter long-term decline in ~ 5 years.

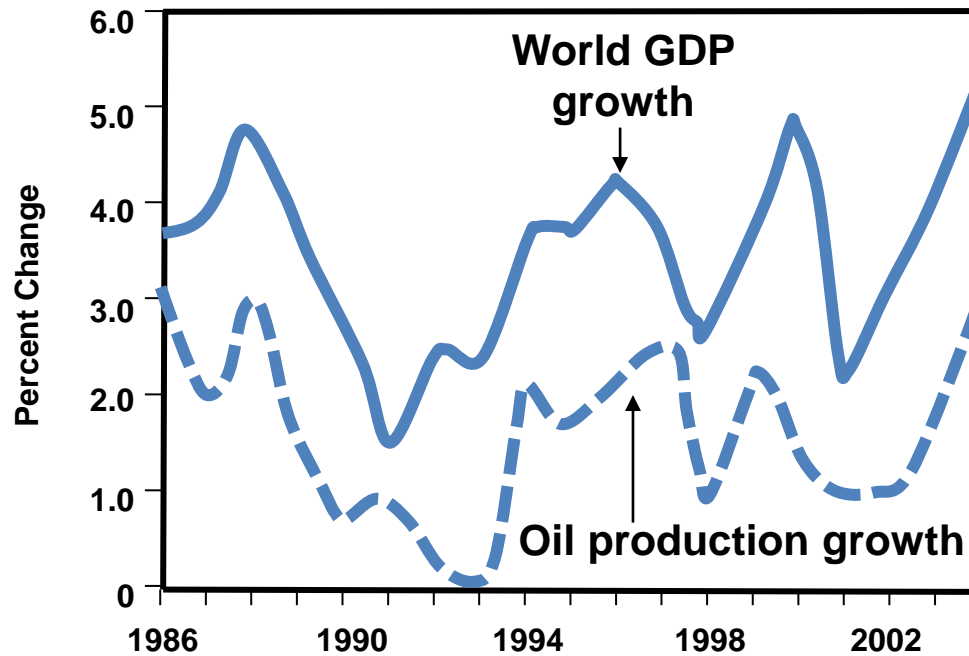


World Oil Production hit plateau in 2004 & stayed in a narrow fluctuation range in spite of the “Great Recession.”

Annually declining production

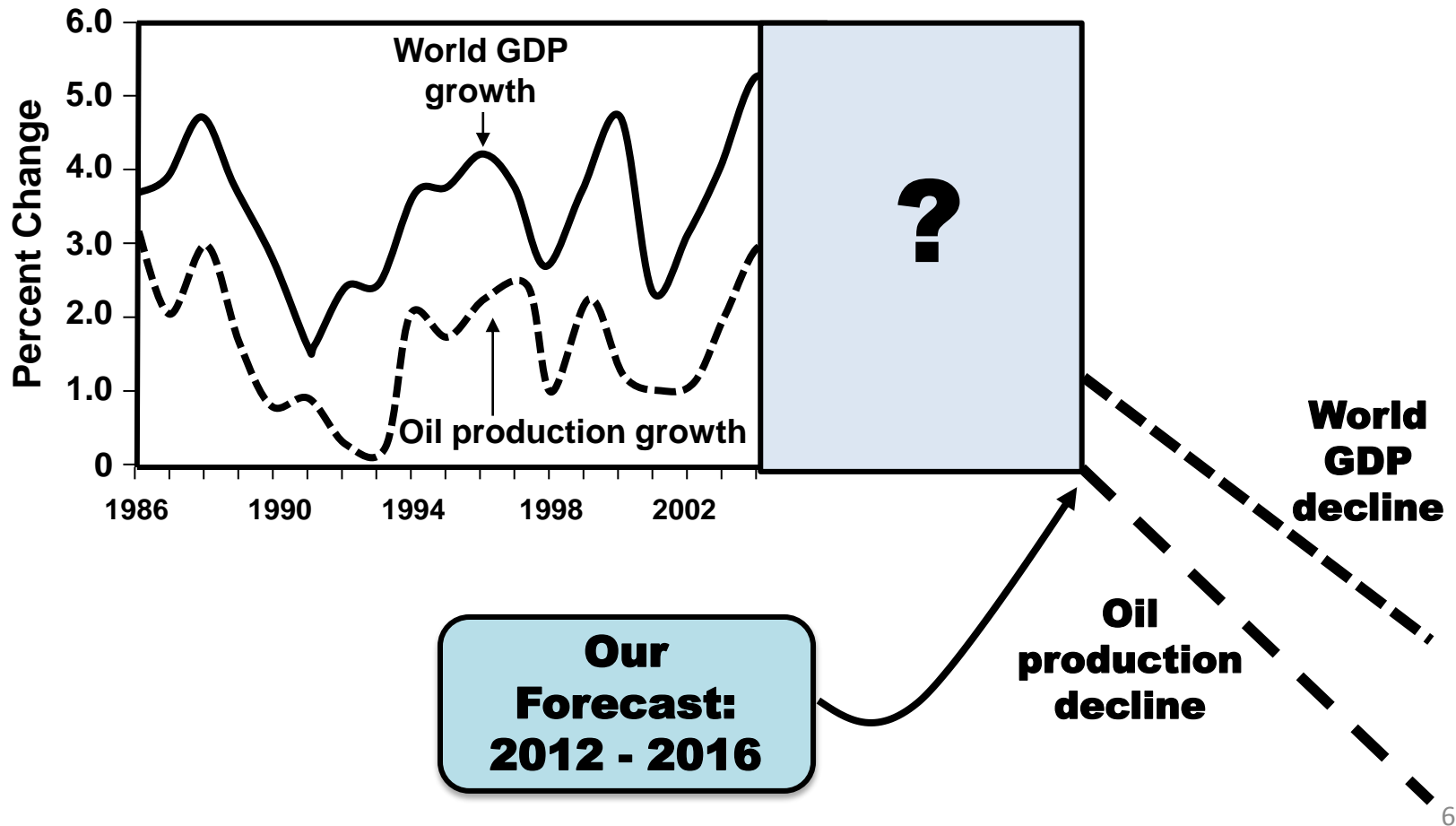
WORLD OIL PRODUCTION AND WORLD GDP GROWTH RATES

Growth Rates have been tightly coupled for decades.



IMPACTS OF WORLD OIL PRODUCTION DECLINE

World oil production will begin to decline
Within ~ 5 years & world GDP will follow.



SHOCK OF WORLD OIL PRODUCTION DECLINE

1973 & 1979 tell us what will likely happen when shock of world oil production decline becomes widely realized

- Sudden panic, disorientation, & insecurity
- Immediate **liquid fuel shortages**
- **Large increases in fuel prices**
- **Fuel hoarding**
- **Difficult commuting**
- **Increasing inflation**
- **Growing unemployment**
- Declining real estate prices in areas far from work or public transportation. Vacation & entertainment areas hard hit.
- **Deepening recession** until effective mitigation takes hold.
- “It will be the similar this time,” but it will last much, much longer.



OPTIONS WHEN CRISIS HITS

- **Do nothing** & hope for best: Initial response, but not for long
- **Telecommuting**: Great -- unless you are a cop, fire fighter, teacher, health care worker, sales worker, food worker, guard, truck driver, factory worker, etc.; e.g. most people cannot
- **Carpooling**: Will increase, but even increasing by 2X, 3X, or 4X will have relatively little impact.
- **Mass transit**: Limited scope: 95% of commuters do not/ cannot use it, & many transit systems already at capacity.
- **Demand destruction**: AKA depression & unemployment; is problem to be avoided, not a solution.



PHYSICAL RATIONING UNAVOIDABLE

- **Public will demand that govt. “DO SOMETHING”!**
- “Rationing” required to allocate scarce fuel
- We assess **4 generic options** that could be implemented in U.S. & elsewhere:
 - I. Oil price & allocation controls
 - II. Coupon gasoline rationing
 - III. Variable gasoline tax and rebate
 - IV. No price controls, but partial rebates
- Based on fuel rationing plans developed by U.S. Federal govt. in 1970s & 1980s

DO SOMETHING!



A BASIC MILEAGE RATION
UNITED STATES OF AMERICA
OFFICE OF PRICE ADMINISTRATION

F 862208V

Mr. Harriet Brown
(NAME OF REGISTERED OWNER)

8-3636
(VEHICLE LICENSE NO.)

Calo.
(STATE OF REGISTRATION)

Palisade, Calo.
(CITY OR POST OFFICE) (STATE)

1936
(YEAR MODEL)

Plymouth
(MAKE)

Coach
(BODY TYPE)

Nov. 17, 1942
(DATE)

FORM O.P.A. R-525A (USE TAX STAMP NO.)



CRITERIA COMPARING RATIONING PLANS

- **Microeconomic effects:** How plans affect prices, economic efficiency, supply incentives, inventory behavior, etc.
- **Macroeconomic effects:** How plans affect economic growth, inflation, & other macro variables
- **Equity:** Who wins & who loses? Are people in similar situations treated alike? Is plan perceived as fair by different groups?
- **Practical problems:** All the indirect costs of a plan: Bureaucracy, enforcement, constituency development, cheating, fraud regs, etc.



I. PRICE & ALLOCATION CONTROLS

- **Imposes oil price controls**, entitlements program, & regs in effect in U.S. 1973 – 81: Price ceilings imposed on domestic crude so prices do not rise with world oil prices
- Govt. imposes **refiner entitlements system**, averaging prices of domestic & imported oil, so all U.S. refiners pay same price
- Thus, even under price controls, price of crude oil rises
- Controls on price markups of downstream operators to prevent them from raising prices
- Oil market does not clear; allocation regs required to force suppliers to sell reduced volumes to their historical customers
- **Further actions may be required**; govt. make refiners produce less gasoline & more fuel oil

**Govt. designates priority users,
who receive higher shares**



I. PRICE & ALLOCATION CONTROLS

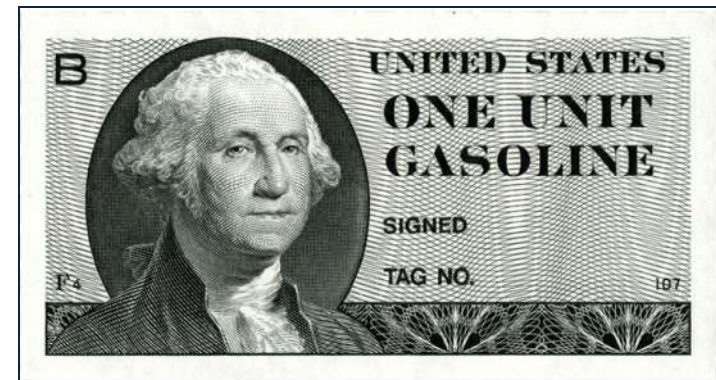
Gas stations receive reduced supplies based on historical purchases



**Gasoline demand at controlled price
exceeds supply & gas lines result**

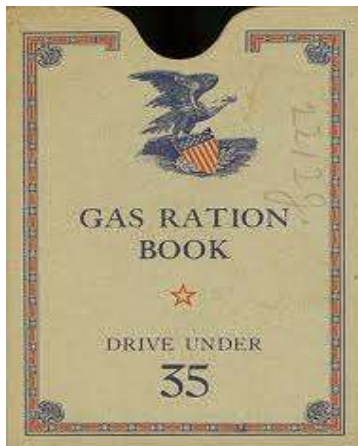
II. COUPON GASOLINE RATIONING

- **Uses coupon (paper or electronic) rationing** instead of allocation controls, but retains other controls in Plan I
- Limits fuel price increases; uses coupons instead of queues to allocate gas
- Coupons distributed to registered vehicle owners, to firms based on historical use, & to priority/hardship users
- **Coupons can be sold, & market forces set prices**
- Price controls ensure gas prices do not rise to clear market.
- Price controls on domestic crude required
- No price & allocation controls on oil products except gasoline; refiners can increase prices and & quantities of these products.



II. COUPON GASOLINE RATIONING

- Ration checks exchanged for coupons at designated issuance points
- **Local boards established** to administer **state ration reserves**, for allotments to those with severe hardships.
- **Ration coupons required to buy gas**
- These then transferred from retailers up distribution chain to refiners &, finally, back to govt.

This is a 'Gasoline Ration Card' (Form OPA R-501) from the United States Office of Price Administration. The card is yellowed with age and has handwritten information. At the top left is a small logo with the words 'WORLD WAR II WAR STAMPS'. The title 'GASOLINE RATION CARD' is printed in the center, with the number 'No 476947 -A' below it. A large, bold letter 'A' is printed in the top right corner. The card contains several fields with handwritten entries: 'OWNER'S NAME' is 'Leroy C. Haynes', 'STREET ADDRESS' is '1129 Zanesville St', 'CITY OR POST OFFICE' is 'Chester', 'STATE' is 'Pa', 'MAKE' is 'Ford', 'BODY STYLE' is 'Sedan', and 'VEHICLE REGISTRATION NO.' is '75367'. A vertical stamp on the right side reads 'Leroy C. Haynes' and 'Chester, Pa'. At the bottom, there are six small circles, each with the word 'ONE' above it and 'UNIT' below it. A note at the bottom reads 'READ INSTRUCTIONS ON REVERSE SIDE OF THIS CARD'.

III. GASOLINE TAX & REBATE

- System of **emergency gasoline taxes & rebates** structured to have effects similar to gasoline rationing with free market in coupons
- No price & allocation controls on gasoline, but they are required on crude oil & petroleum products
- Level of variable tax on gasoline set so that refiners can pass through increases in average crude oil prices
- As world oil prices & gasoline demand change, size of tax changes
- **Tax revenues rebated** to registered vehicle owners



SIMILARITIES BETWEEN PLANS I & II

- **Under rationing plan:**
- Govt. controls gasoline price at \$5/gal.
- A ration check (or electronic transfer) for a set # of ration coupons, each good for 1 gal., sent to each vehicle registrant (limit of 3 vehicles/household)
- Assume each car owner gets 10 “coupons”/week.
- Persons requiring > 10 gal./a week can buy coupons from those needing < 10 gal.
- As free market for coupons develops, going price might settle at $\sim \$6$ /coupon under a 20% oil shortage.
- Thus, gallon of gasoline can be purchased for \$5 & a coupon worth \$6.
- **Market clearing price of gasoline is \$11/gal.**



SIMILARITIES BETWEEN PLANS I & II

- Under gas tax & rebate plan, results are similar
- For shortage of same size (20%), market clearing price is still \$11/gal.
- An emergency gas tax of \$6/gal. instituted
- Tax & rebate plan permits oil distribution network same profits as coupon rationing plan.
- Instead of providing 10 coupons worth \$6 each, govt. sends \$60/week to each vehicle registrant, with limit of 3 vehicles/household.



IV. GENERAL REBATE

- **Prices of all petroleum products increase**
- Prices determine how much of each product is produced & how products distributed
- Domestic oil prices rise
- **Windfall profits tax captures large % of oil revenue, which is then rebated**
- Rather than avoiding price increases with price controls, plan accepts price rises & offsets negative economic consequences with rebates
- Whereas gasoline consumers are most directly affected under plans II & III, all consumers are affected here



IV. GENERAL REBATE, 2

- Rebates made though adjusting federal tax rates, changing withholding rates, transfer payments, etc.
- Recessionary effects of fuels shortage reduce tax receipts, but these could be offset revenue from WPT
- Some portion of rebate could be used to reduce corporate or other taxes
- Since consumers receive income from rebates, **most businesses would be able to maintain their market.** Some, however, would not



California fruit growers using trucks to transport produce to Eastern markets find their goods less competitive with fruits produced closer to the market

MICROECONOMIC EFFECTS

I. Price & allocation controls. Prices do not rise; queues result

- True price of gas, including waiting in line, rises to market-clearing levels; **"waiting cost" reduces consumer welfare same as gas price increase**
- Difference: With no price controls a higher dollar price is paid to others in the domestic economy & does not involve loss in well-being for nation.
- But **increase in effective gas price caused by queuing is a net loss to society** -- equivalent to \$100s billions
- As govt. allocations diverge from highest value uses, efficiency losses result
- **Allocation rules based on historical use unable to keep up with changing use patterns** or reduce consumption efficiently
- Govt. sets oil distribution priorities & **interest groups influence decisions**
- Inventory behavior affected by allocation plan selected
- Price controls, rationing, & taxes limit future profits from storing oil & less oil is stored by private market prior to disruption.



In disruptions, price controls delay oil price increases; people motivated to hold stocks while prices increase.

MICROECONOMIC EFFECTS, 2

II. Coupon gasoline rationing. Eliminates gas lines & allocates supplies to highest value uses; **causes inefficiencies in oil market**

- Most of shortfall borne by gasoline & plan allocates other, underpriced refined products to those who would otherwise conserve
- **Very expensive conservation measures forced on gas consumers;** inexpensive conservation efforts for other oil products forgone
- Auto commuting very expensive, especially for low-income persons, & industries that depend on auto traffic severely affected
- Price & allocation controls; no incentives to increase production

III. Gas tax & rebate. Similar to rationing plan: (i) losses borne by gas users (ii) losses from price controls are same; (iii) consumers do not face market prices for gas; (iv) no incentives to increase domestic oil production

- No gas price controls; more efficient allocations

IV. General rebate. Minimizes microefficiency losses.

- Encourages conservation in use of all oil products
- **Puts available oil supply highest valued uses**
- Avoids socially divisive gas lines.



Price controls try to minimize price increases; but true price of gas (controlled price plus value of ration coupon) rises dramatically.

MACROECONOMIC EFFECTS

I. Price & allocation controls. Does not mitigate supply-side macro costs

- Higher effective oil price reduces GDP
- Queuing costs huge, but not measured directly
- **Oil price ceilings limit money transfers to oil producers & resulting oil price drag** on nonpetroleum markets
- Oil price ceilings limit increases in the CPI
- GDP lowered due to inability to allocate oil products to most valued uses



II. Coupon rationing. Does not alter supply-side effects, but by controlling domestic oil prices it limits fiscal drag

- **Ration coupons are 2nd currency** that insulates economy from fiscal drag
- If coupon price excluded from CPI, inflationary impact is reduced
- **Retards economy less by allowing free-market coupon trading & allocates gasoline more efficiently than direct allocations**
- GDP higher & inflation less than under price & allocation controls alone

Some costs, such as gas lines, represent loss of general welfare, but do not reduce measured GDP.

MACROECONOMIC EFFECTS, 2

II. Gas tax & rebate. Does not alter supply-side effects of oil shortfall

- Limits oil price drag if tax is rebated simultaneously, but with uncertain & uneven rebate adverse impacts are large
- **CPI reflects gas price increase, & this is significant** – if gas prices double, CPI increases > 5% in 1st month (80% annually)
- Increasing CPI increases indexed wages, entitlements, & contracts
- **Inflation increases production costs**, & inflationary impact prolonged by 2nd & 3rd round effects on wages & prices

IV. General rebate. Does not mitigate supply-side costs of oil shortfall

- **Allows free markets & prices & achieves greater efficiency & higher GDP than any other plan**
- Even if rebates distributed immediately, some oil price drag occurs
- Funds flow from non-oil to oil sectors.
- Rising oil prices increase the CPI
- Efficiency gains in resource allocation & administrative costs

EQUITY

I. Price & allocation controls. Income transfer from those who value their time highly to those who value it less

- **Historical allocation not "fair;"** some regions growing faster & allocation on historical basis becomes less fair over time
- People may stay closer to home during shortfall, & pro rata allocation of gas to superhighway stations would oversupply them while undersupplying urban stations

II. Coupon rationing. Equity **depends on coupon distribution**

- If fairness means reestablishing person's purchasing power, coupon allocation should be according to amount of gas consumed prior to disruption
- If it means equal assistance to all income groups, or more to poor people, coupon distribution in proportion to vehicle ownership not appropriate

Coupon rationing could be used explicitly to redistribute income



EQUITY, 2

III. Gas tax & rebate. If rebate is allocated same as coupons, income distribution would be same as under rationing

- **Distribution of money makes income redistribution evident to public**
- Distributing coupons to vehicle owners may be perceived as fair, but equivalent distribution of money may not

IV. General rebate. Uncontrolled prices seen as unfair; money transferred from consumers to oil companies

- General rebate only partially compensates for this transfer, but rebate could be increased by adding emergency surcharge to WPT
- If rebate distributed to all citizens, some will argue that others are receiving too much
- **Fairness of plan depends on tax rate & plan structure**



PRACTICAL PROBLEMS

I. Price & allocation controls. Price control system imposed

- Each oil company & refinery submits detailed info to federal agencies to determine refiner's entitlement obligations
- Oil companies keep records of all transactions for govt. audits
- Large bureaucracy required
- Initiating plan requires months & make control system obsolete
- **Long gas lines are socially divisive**
- Interest groups would oppose removal
- Oil-exporting nations can raise prices w/o demand reduction from price increases



IV. Coupon rationing. Oil price & allocation controls

- **Rationing creates new currency** parallel to the monetary system
- Requires hiring & training many govt. workers
- Private sector costs would be high
- Motor vehicle registration files obsolete; error rt. could be 20%

Once in place, controls not easily removed: U.S. “emergency” controls enacted in 1971 & 1973 did not end until 1981

PRACTICAL PROBLEMS, 2

III. Gasoline tax and rebate. Price controls & gas taxes & rebates

- Gasoline excise tax could be raised to desired level
- Inventory profits must be controlled
- **Difficult & expensive to use existing mechanisms** (tax withholding, veterans' benefits, LIHEAP, welfare, etc.) to distribute rebates
- If rebates distributed on basis of car ownership, info on vehicle registrations needed; if distributed by adjusting tax withholding rates, tax credits will be required for many persons
- Procedures for non-taxpaying vehicle owners required
- Many govt. employees required for compliance
- No precise indicators of market equilibrium
- Difficult to set excise tax; consequences of mistakes severe
- **Govt. must adjust excise tax on weekly/monthly basis** as oil prices & supplies change & demand shifts over time
- Uncertainty in estimating tax levels complicates fiscal & monetary policy
- Rebate recipients using little gas would not want to change system



Income transfers could total >\$500 billion/yr.; fraud would occur

PRACTICAL PROBLEMS, 3

IV. General rebate. Large shocks strain market mechanisms

- No new tax mechanism required, but new rebate mechanisms needed to handle huge revenues generated
- If rebates are per capita, rebate mechanism is very difficult
- Master list of all citizens for distributing rebates may be **invasion of privacy**, especially since plan required ahead of emergency
- If income tax system used, many people who do not file tax returns need to do so to receive the rebate.
- If rebates > many families' withholding liability, refundable credits or withholding reductions & sales & payroll tax reductions required.
- Procedures needed to deal with hardship cases, exceptional needs of medical patients, low-income users of fuel oil, etc.
- Rebate program must avoid encouraging oil use
- Rebates can be distributed via EFT/EBT, but this raises **problems of access, cost, security, fraud**, etc.



WOP will rise rapidly & plans difficult & time-consuming to implement are less useful; demand reductions under general rebate plan are immediate.

OVERALL EVALUATION

Microeconomic efficiency:

- **General rebate plan allows most flexibility** in adapting to oil shortage & provides greatest incentive for increased domestic oil production & storage
- Coupon rationing & tax rebate plans allow efficient allocation of gasoline, but do not provide for the optimal mix of petroleum products
- If burden of oil shortfall is placed primarily on gasoline, these 2 plans are less efficient than general rebate plan
- **Price & allocation plan is the most inefficient:** Allocations based on historical usage or queuing, both of which impose enormous social costs

Macroeconomic efficiency:

- **No plan can prevent higher prices & recession**
- True price of oil (queues, coupons, or dollars) will increase
- Loss of oil will reduce output & raise prices
- Allocation plans & monetary & fiscal policies can affect costs
- Massive fund movement into oil market reduces output in nonoil sectors
- **Oil price drag** occurs most with gas tax & rebate & general rebate plans
- If allocation plan excludes oil price increases from the CPI, agreements, contracts, & programs indexed to CPI will escalate less rapidly
- Price controls keep oil price increases out of CPI by requiring payment in gas lines, rationing keeps gas price increases out of CPI by creating 2nd currency



Govt. may have to enact legislation to override CPI inclusion of petroleum increases in times of national energy emergencies

OVERALL EVALUATION, 2: EQUITY

- Equity is matter of perception; **no plan perceived as fair by all**
- **General rebate plan may be perceived as least equitable:** It allows prices to rise & oil companies to charge what market will bear; wealth transferred to domestic & foreign oil producers
- Even if WPT is enacted & all revenues rebated to consumers, public perception is oil companies making money at their expense
- Gas & rebate plan perceived as unfair because it involves explicit tax on consumer products
- Gas rationing plan, which is as fair as the tax and rebate plan, may be perceived as most equitable means of allocating gas supplies
- Even though the 2 plans lead to similar distributions of gas supplies, **coupon confers a "right" to a gal. of gas in way that currency does not**
- Coupon rationing plan perceived by some (those who do not own cars) to be unfair
- Arbitrary nature of 1st-come, 1st-served gas lines resulting from coupon plan cannot be perceived as fair



OVERALL EVALUATION, 3

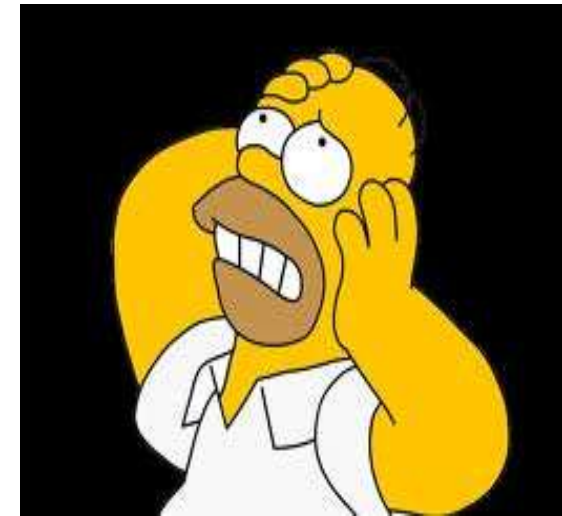
Practical problems are important considerations

- 3 plans -- price controls, rationing, & gas tax & rebate – require oil price controls
- These controls & attendant entitlements program simultaneously with gas rationing could strain Federal agencies' resources
- **Ability of general rebate plan to allocate oil supplies quickly gives it advantages over other plans**

Plans require different amounts of info

- Rationing plan must forecast gas volumes available months ahead
- Gas tax & rebate plan requires estimates of size of tax necessary to equate demand & supply
- General rebate plan requires less data for decisions required

Ease of dismantling a plan important concern



Plans requiring any form of price controls may prove more difficult to phase out than ones that do not.

SUMMARY EVALUATION OF CONTINGENCY PLANS

Criteria	I. Price & Allocation Controls	II. Coupon Rationing	III. Gas Tax & Rebate	IV. General Rebate
Micro-economic Effects	Gasoline prices artificially low Gasoline queues Pronounced micro inefficiencies Interregional & inter-temporal inefficiencies	No gasoline queues Inefficiencies among petroleum products Price & allocation controls No production incentives	Effects similar to plan 2 More efficient than gasoline rationing	Minimizes micro losses No gasoline queues Allocates oil to high value uses Encourages conservation Encourages production
Macro-economic Effects	Reduces GDP Increases prices Queuing costs Limits income transfers Inhibits resource movement	Limits fiscal drag No impact on supply side Creates second currency May reduce GDP No impact on CPI	No effects on supply side Limits oil price drag Increases CPI	Mitigates supply-side effects Higher GDP Higher economic efficiency Increases CPI
Equity	Income transfers on basis of time value Regional inequities	Depends on criteria for coupon distribution	Depends on criteria for rebates Money rebates more explicit than coupons	Uncontrolled prices seen unfair Huge income transfers from consumers to producers Depends on rebate structure Bad signal to oil-producing countries
Practical Problems	Price control & allocations Administrative costs Social divisiveness Difficult to dismantle Less impact on conservation	Price controls & allocations Administrative costs High error rate Constituency development	Legislation of taxes & rebates Administrative problem with Rebates Constituency development	Strain on market mechanism New rebate methods required Administrative problems Time to implement

Source: Management Information Services, Inc.

CONCLUSIONS

- All options suck: There are no “good” alternatives
- **Increased govt. involvement unavoidable**
- Any plan will be complex, expensive, & disruptive
- Economy & jobs will hurt no matter what we do
- **Goal is economic & social damage control**
- Preference among options determined by ideology, experience, constituency etc.
- However, **ignoring the problem is not a solution**



To paraphrase General Sherman:
“Rationing is hell, and you cannot refine it.”

“BLACK SWAN” EVENTS DO OCCUR

Ignoring the problem is not a solution:

- No one thought Japanese would attack Pearl Harbor
- No one thought 9-11 could happen
- No one thought U.S. housing prices could collapse

They happened, and we were not prepared



FINAL THOUGHT

- Whatever the plan, it should be thought of as a parachute: “Hope to God you never have to use it but, if you do, it better work!”

