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The Optimal Gasoline Tax for Vietnam

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ABSTRACT

This paper estimates a welfare-based optimal gasoline tax for Vietnam using the second-best optimal taxation framework pioneered by Parry and Small (2005) and later applied to China by Lin and Zeng (2014). Vietnam's gasoline taxation system currently consists predominantly of the Environmental Protection Tax and the Special Consumption Tax; nevertheless, neither tax fully captures the marginal social costs and revenue-efficiency considerations of gasoline consumption. The model decomposes the optimal tax into a corrective Pigouvian and a revenue-raising Ramsey component. Calibration results indicate a total optimal tax of approximately 1,177.3 cents per gallon, more than twenty times the current statutory rate of 45 cents per gallon. The large central estimate comes principally from the unusually high fuel efficiency of Vietnam's motorcycle-dominant fleet and from a calibration in which the VMT response to fuel prices exceeds the fuel-use response. Together, these features translate per-mile externalities into pronounced per-gallon damages. While the magnitude of the result makes implementation politically infeasible, it offers a meaningful diagnostic for evaluating and potentially reforming Vietnam's current gasoline tax structure.

Index terms - optimal gasoline tax, Vietnam, Pigouvian tax, Ramsey tax, gasoline demand elasticity

I. INTRODUCTION

1.1. Vietnam's Gasoline Taxation System

Vietnam taxes gasoline consumption through a layered system that combines environmental, consumption, and value-added components. In particular, gasoline is taxed through the Environmental Protection Tax (EPT), which strives to address the environmental repercussions associated with fuel use, and the Special Consumption Tax (SCT), which applies to selected goods deemed socially or economically sensitive. Alongside the value-added tax (VAT) and other price-stabilization mechanisms, these taxes constitute a significant portion of the final retail price paid by consumers. According to the Vietnam Petroleum Association, taxes and fees amount to approximately 50.4% of the retail gasoline price [1], with the EPT and SCT together forming the largest single fiscal wedge on fuel consumption. At the fiscal level, the Ministry of Finance reported that environmental protection tax revenue accounts for around 4.1% of total state budget revenue, of which roughly 99% comes from fuels. By extension, the Vietnam Chamber of Commerce and Industry calculated that including import duties, SCT, and VAT on fuels would elevate the fuel-related contribution to 9.8% of total budget receipts [2]. Evidently, gasoline

taxation already plays a meaningful role in Vietnam's environmental policy and is a noticeable source of public revenue.

Despite its importance, Vietnam's current gasoline tax structure is not built to deliberately weigh revenue needs against the social costs of gasoline use. The EPT is motivated by environmental concerns, but its level is not explicitly linked to the marginal environmental damages from gasoline use. Meanwhile, the SCT serves broader revenue and regulatory objectives, but it does not directly account for congestion costs, accident externalities, or interactions with the broader tax system. In practice, Vietnam's gasoline tax structure synthesizes several policy goals rather than following a single welfare-based optimization framework. This raises the central question of this paper: whether the overall tax burden on gasoline is too low, too high, or appropriately aligned with the social costs generated by gasoline consumption.

1.2. Vietnam's Transportation Structure and Externalities

The complexity of this policy issue stems from Vietnam's transportation system itself. Differing from many developed economies where private automobiles dominate, Vietnam is heavily dependent on motorcycles for daily mobility, with motorcycles accounting for an overwhelming majority of registered vehicles. As of September 2024, Vietnam had more than 77 million registered motorcycles nationwide, corresponding to approximately 770 motorcycles per 1,000 inhabitants, one of the highest ownership rates worldwide; consistent with this pattern, motorcycles comprise 85-90% of road traffic, reinforcing Vietnam's dependence on two-wheelers relative to most countries [3].

In this context, the relationship between gasoline taxation and external costs in Vietnam differs structurally from that of more automobile-oriented economies. Despite the dominance of gasoline-fueled motorcycles in Vietnam's vehicle fleet, the country's aggregate fuel use per person is modest by international standards. The Global Economy documents that, in 2023, Vietnam's average gasoline consumption was about 99.5 liters per capita, compared with a world average of roughly 222.5 liters (and, by comparison, more than 1,500 liters per capita in the United States) [4]. These figures underscore that Vietnam is not an exceptionally high gasoline consumer in per-capita terms, even though its motorization rate via motorcycles is extremely high.

Aggregate consumption, though, presents a different story. Vietnam's motor gasoline consumption rose from 5.474 thousand barrels per day in 1980 to 174.805 thousand barrels per day in 2024, more than a fivefold increase since 2000 alone, with the sharpest setback since then during the COVID-19 downturn of 2020-2021 (Figure 1). Modest per-capita use across a population of roughly 100 million can sum up to a large and expanding national fuel base. Within the context of this research, this growth matters in two respects. First, it widens the base on which any gasoline tax is levied. Second, it expands the volume of road travel that gasoline supports, which, as the following discussion demonstrates, is the channel through which most external costs arise.

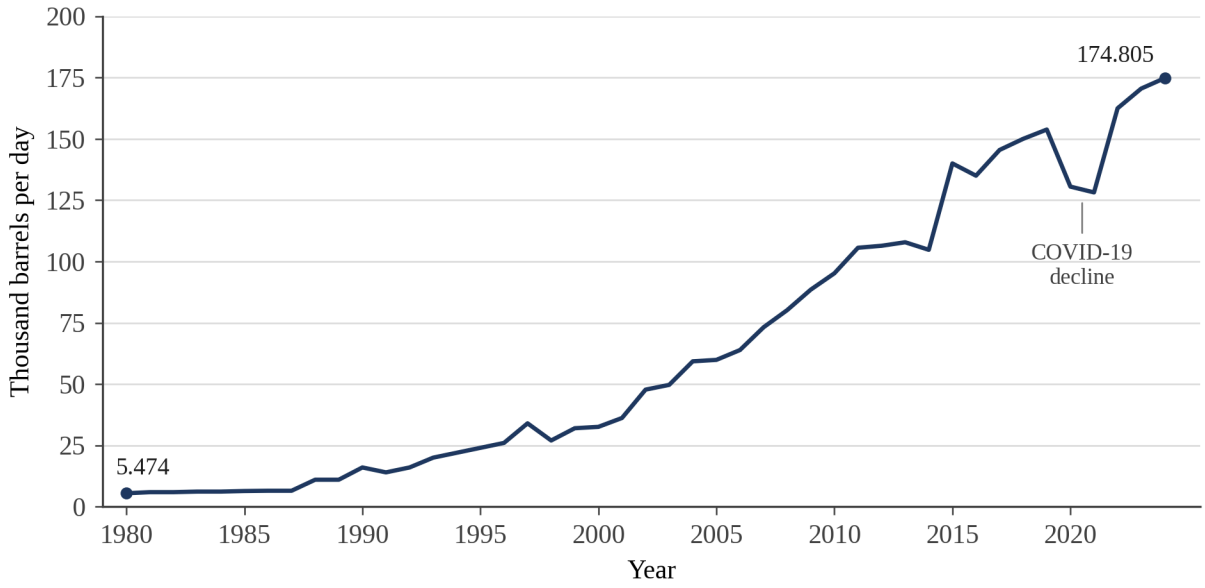


FIGURE 1. Motor gasoline consumption in Vietnam, 1980-2024 (thousand barrels per day).
Source: Author's construction using data from the U.S. Energy Information Administration, International Energy Statistics (accessed September 27, 2026).

What ultimately matters for transportation externalities is not fuel volume per person but rather the amount of travel that fuel supports. Congestion, traffic accidents, and much of local air pollution are driven chiefly by vehicle-miles traveled (VMT). Each additional kilometer on the road increases travel time for other drivers, raises collision risk, and adds to local emissions. This holds regardless of whether it is produced by a relatively efficient motorcycle or a less efficient car. Motorcycles are markedly more efficient: a typical Vietnamese motorcycle covers a given distance on roughly a quarter of the fuel a passenger car would require (later shown in Section 3.1).

Thanks to this efficiency, each liter of gasoline is converted into a relatively large number of vehicle-kilometers. For this reason, the external cost per gallon of gasoline can be high even when per-capita gasoline use is comparatively low, and distance-based externalities become especially pertinent for evaluating gasoline taxation in Vietnam. This makes Vietnam an analytically important case for examining whether existing gasoline taxes adequately reflect the broader social costs of transportation activity, rather than merely the fuel-related pollution damages that scale directly with gallons burned.

Although the Vietnamese government has increasingly promoted a long-term transition toward electric vehicles, such considerations lie beyond the scope of this paper. Instead, the analysis concentrates on the existing gasoline-dependent transportation fleet in order to derive a welfare-based benchmark for gasoline taxation for Vietnam.

1.3. Research Objective and Approach

This paper estimates a welfare-based benchmark for Vietnam's optimal gasoline tax under a second-best framework. In a first-best setting, the government could raise revenue through a lump-sum tax that leaves consumer behavior unaltered, in which case the sole purpose of gasoline taxation would be to correct the externalities precipitated by gasoline consumption. Yet Vietnam, like virtually every real government, instead relies primarily on labor taxation to raise revenue, which discourages work at the margin and introduces an ineluctable efficiency cost that the optimal gasoline tax must also account for. Taxing gasoline further reduces the value of after-tax wages, which amplifies the existing distortion from labor taxation and hence warrants a smaller corrective tax than the externality alone would justify. Simultaneously, because gasoline demand is relatively price-inelastic, taxing it efficiently raises revenue, which argues for pushing the tax beyond correction.

Accordingly, the optimal gasoline tax comprises two components. The first is an adjusted Pigouvian term, which prices an externality at its social cost. Here, that means the per-gallon tax that would correct gasoline's externalities on its own, scaled down because gasoline is bought with already-taxed wages, so taxing it also taxes labor indirectly. The second is a Ramsey term, which raises revenue efficiently by falling more heavily on goods whose demand is more price-inelastic. Justified purely by gasoline's inelastic demand, it allows the government to raise revenue with a lower deadweight loss than would result from imposing even heavier labor taxes. Together, these two terms form the second-best optimal gasoline tax for Vietnam, which this paper seeks to estimate.

The study applies the optimal gasoline tax model developed by Parry and Small (2005) [5] and later applied to China by Lin and Zeng (2014) [6]. The resulting benchmark is then compared with Vietnam's current gasoline taxation structure to evaluate whether existing gasoline taxes adequately reflect the social costs associated with gasoline consumption.

Calibration results suggest that Vietnam's current gasoline tax level falls substantially below the welfare-based benchmark implied by the model. Our results indicate that the estimated adjusted Pigouvian gasoline tax is approximately 1,009.4 cents per gallon, while the Ramsey component is roughly 167.9 cents per gallon, compared to a current statutory gasoline tax of approximately 45 cents per gallon. The magnitude of the estimated benchmark makes it unlikely that the derived optimal tax will be politically implemented, though it remains useful to gauge the current underpricing and to guide potential incremental policy reform.

The remainder of the paper is organized as follows. Section II addresses the analytical framework. Section III calculates the parameter values. Section IV discusses the results and their limitations. Section V concludes.

II. ANALYTICAL FRAMEWORK

This paper adopts the optimal gasoline tax framework developed by Parry and Small [5], which decomposes the optimal gasoline tax into corrective and revenue-raising components. The analytical structure also follows the application of this framework to determine the optimal tax rate in China by Lin and Zeng [6]. This study calibrates the model's adjusted Pigouvian and Ramsey components with Vietnam-specific parameters.

Gasoline consumption generates several negative externalities that are not fully internalized in private driving decisions, including local air pollution, global climate damages, congestion, and traffic accidents. As such, the market price of gasoline understates the broader social costs associated with vehicle use. At the same time, governments rely on distortionary taxes, particularly labor taxation, to raise revenue, introducing additional deadweight loss into the economy. In this setting, the optimal gasoline tax emerges as a second-best policy instrument with two economic purposes: correcting externalities and improving revenue efficiency by shifting part of the tax burden toward relatively inelastic gasoline demand.

Because lump-sum taxation, which could raise revenue without distorting behavior, is unavailable in practice, the government must meet its assumed revenue requirement G entirely through distortionary tools. The government must finance the total revenue through a combination of labor and gasoline taxation:

$$t_L L + t_F F = G$$

where t_L is the labor tax rate, L is aggregate labor income, t_F is the per-gallon gasoline tax, and F is total taxable gasoline consumption. This constraint links the two tax instruments and motivates the Ramsey component.

Accordingly, the optimal gasoline tax is expressed as the sum of an adjusted Pigouvian component and a Ramsey component as follows:

$$t_F^* = Adjusted\ Pigouvian\ tax\ +\ Ramsey\ tax,$$

where:

$$Adjusted\ Pigouvian\ tax\ =\ \frac{MEC_F}{1+MEB_L}$$

$$Ramsey\ tax\ = \frac{\left(1-\eta_{MI}\right)\varepsilon_{LL}^{c}}{\eta_{FF}} \frac{t_L\left(q_F+t_F\right)}{1-t_L}$$

and where:

$$MEC_F = E^{P_F} + \left(\frac{\beta M}{F}\right)\left(E^{C} + E^{A} + E^{P_M}\right)$$

$$\beta = \frac{\frac{dM}{dt_F}}{\frac{dF}{dt_F}} \frac{F}{M} = \frac{\eta_{MF}}{\eta_{FF}}$$

$$MEB_L = \frac{-t_L \frac{\partial L}{\partial t_L}}{L + t_L \frac{\partial L}{\partial t_L}} = \frac{\frac{t_L}{1-t_L}\varepsilon_{LL}}{1-\frac{t_L}{1-t_L}\varepsilon_{LL}} = \frac{t_L \varepsilon_{LL}}{1-t_L\left(1+\varepsilon_{LL}\right)}$$

In this framework, MEC_F represents the marginal external cost of gasoline consumption. Fuel-related externalities, such as global climate damages, enter directly on a per-gallon basis as E^{P_F}, because CO_2 emissions are proportional to fuel combustion regardless of distance traveled. Meanwhile, distance-related externalities (including congestion, accident risk, and local air pollution) arise from road presence instead of volume of fuel burned. The factor M/F converts these per-mile costs into per-gallon equivalents by expressing how many miles of road exposure one gallon of gasoline produces.

Noteworthily, the parameter $\beta = \frac{\eta_{MF}}{\eta_{FF}}$ adjusts the per-gallon distance costs and embodies the relationship between two behavioral responses to higher gasoline prices. The denominator, η_{FF}, measures the total percentage reduction in fuel consumption for each percentage increase in the gasoline price, encompassing every way a driver may react. By contrast, the numerator η_{MF} isolates solely the driving-reduction response through the percentage reduction in miles traveled per percentage increase in gasoline price. Their ratio β therefore compares the percentage reduction in miles traveled with the percentage reduction in fuel use.

This distinction matters because improvements in fuel efficiency may lessen gasoline use without reducing distance-based externalities, which fall only when people drive less. If fuel efficiency were fixed, miles traveled and fuel use would fall proportionately, so that β = 1. Values below one indicate that fuel use falls by more than driving, implying that part of the fuel reduction comes from enhanced fuel efficiency. In this case, the per-gallon distance costs are scaled down. Conversely, values above one indicate that miles traveled fall by more than fuel use, and the per-gallon distance costs are scaled up.

The Ramsey component captures the revenue-raising role of gasoline taxation, as taxing relatively inelastic gasoline demand imposes fewer behavioral distortions than further taxing labor income. The compensated labor supply elasticity ε_{LL}^{c} measures how responsive labor supply is to wages (with utility fixed), and the marginal excess burden of labor taxation MEB_L gives the deadweight loss resulting from an additional dollar raised through taxing labor.

A detailed theoretical derivation of the model is provided by Parry and Small (2004).

III. CALCULATING THE PARAMETER VALUES

3.1. Initial Fuel Efficiency M/F: 105.84 Miles/Gal

The initial fuel efficiency parameter M/F represents the average miles traveled per gallon of gasoline by Vietnam's gasoline-powered vehicle fleet in the pre-tax equilibrium. Because this paper evaluates the

taxes levied specifically on gasoline, the fleet is restricted to gasoline-powered internal combustion engine (ICE) motorcycles and gasoline passenger cars; diesel and electric vehicles are excluded.

Fuel consumption data for ICE two-wheelers are obtained from the International Council on Clean Transportation, which provides 2021 sales-weighted fuel economy estimates for mopeds and motorcycles covering more than 95% of the Vietnamese market [7]. After excluding electric two-wheelers and re-normalizing shares within the ICE segment, the representative two-wheeler fuel consumption is:

$$FC_{2W} = 1.90\ L/100\ km$$

The year 2021 is used because it is the most recent year with comprehensive market coverage. Earlier years (2019–2020) show slightly lower fuel consumption (1.86–1.88 L/100 km), but those figures reflect older, smaller-engine fleets and thus understate current fuel intensity.

For gasoline passenger cars, fuel consumption is taken from the national fuel economy series reported by Changing Transport [8]. Because the model applies to gasoline only, the gasoline series is used rather than the all-fuel average. The most recent available estimate (2020) reports:

$$FC_{car} = 7.10\ L/100\ km$$

To construct a nationally representative fleet average, vehicle kilometers traveled (VKT) are used as weights rather than sales shares, since fuel use is proportional to distance traveled rather than fleet composition alone. Average daily travel distances of 20.2 km per motorcycle and 42 km per passenger car are taken from a traffic emission inventory study for Hanoi reported in *Carbon Management* [9]. In the absence of national travel surveys, we apply these distances nationally. These per-vehicle distances are multiplied by active vehicle stock estimates to obtain total daily VKT for each category. The resulting fleet-weighted fuel consumption is:

$$FC_{nat} = 2.2\ L/100\ km$$

Fuel efficiency is therefore: $M/F = 44.996\ km/L = 105.84\ miles/gallon$

This value is adopted as the central estimate of initial fleet fuel efficiency in the baseline calibration.

3.2. Local Air Pollution Damages (Distance Related) E^{P_M}: 2.34 Cents/Mile

There are currently no Vietnam-specific studies that provide marginal local air pollution damages per vehicle-kilometer in a form directly compatible with the optimal gasoline tax framework used in this paper. Accordingly, we adopt the distance-related local pollution damage estimates reported by Parry and Small (2005), updated to 2006 prices as in Lin and Zeng (2014) [5] [6]. Their estimates are constructed

within the same tax model employed here and therefore integrate consistently into our calibration. Given uncertainty in valuing health damages, particularly the role of the value of a statistical life, we use their central estimate as the baseline parameter and consider their reported range in sensitivity analysis.

3.3. Global Climate Change Pollution Damages (Fuel Related) E^{P_F}: 7.03 Cents/Gallon

Similarly, we use the per-gallon estimates reported by Parry and Small (2005), which convert carbon damages into gasoline-equivalent terms, again updated to 2006 prices as in Lin and Zeng (2014) [5] [6]. Since Vietnam-specific estimates of marginal climate damages per liter of gasoline are limited, this paper follows the broader literature in applying the benchmark carbon-damage values for calibration. These figures, as emphasized by Parry and Small themselves, remain highly uncertain.

3.4. External Congestion Cost E^{C}: 2.76 Cents/Mile

We estimate Vietnam's marginal external congestion cost using data from Hanoi and Ho Chi Minh City (HCMC), the country's two largest urban centers with the most severe traffic delays. Because these cities contribute a disproportionate share of national gasoline-powered vehicle activity, and comparable data from less traffic-dense cities are unavailable, they provide the primary empirical basis for estimating the national congestion externality, with the caveat that they may overstate the nationwide average.

According to the 2024 TomTom Traffic Index, Hanoi and HCMC rank among the most congested cities globally in terms of average travel time per 10 kilometers. Drivers in Hanoi lose approximately 115 hours per year in peak-hour traffic, while this figure for HCMC is 96 hours [10]. Official estimates place annual economic losses from congestion at approximately USD 1.2 billion for Hanoi, a figure reaffirmed by the city's Department of Construction in 2026 [11], and USD 1.3 billion for HCMC, as reported by the Institute of Transport Strategy and Development under the Ministry of Transport in 2020 [12]. Considerably higher estimates have circulated in public discussion but were not adopted for reasons elucidated in Section 4.3. Combining 2024 vehicle registration figures with average daily travel distances of 20.2 km per motorcycle and 42 km per passenger car [9], we convert these losses into costs per vehicle-kilometer of approximately 1.771 cents in Hanoi and 1.665 cents in HCMC, or 2.85 and 2.68 cents per mile, respectively. That being said, because the HCMC loss estimate predates the 2024 vehicle data, it likely understates the city's current cost per distance traveled.

Dividing total losses by VKT yields an average cost per kilometer, which acts as a proxy for the marginal external cost in the model. The two differ in opposing directions, though. In congested conditions, an additional vehicle slows all other traffic, so the marginal external cost exceeds the average. Conversely, the reported losses include costs borne by drivers themselves, such as their own time and fuel. They also include diesel-related losses, neither of which belongs in the external cost of gasoline travel. Because the underlying estimates for Hanoi and HCMC do not report their methodologies, these effects cannot be netted out. Instead, we examine the parameter's influence through the sensitivity analysis.

To derive the central estimate, we pool the two cities, dividing their combined losses of USD 2.5 billion by their combined VKT. This yields 1.714 cents per kilometer, or 2.76 cents per mile. This method weights each city by the volume of travel within it, so the estimate reflects where driving occurs instead of treating the two cities as equally representative. We interpret this value as an urban benchmark. As it describes congestion in the country's most traffic-dense regions, it likely overstates the nationwide average.

Data at both ends inform the bounds around this benchmark. Hanoi's estimate of 2.85 cents per mile forms the upper bound, drawn from the city with the most severe measured delays. The lower bound abides by Parry and Small (2005)'s logic: because congestion varies sharply across times and places, the marginal congestion cost relevant to a national fuel tax must be averaged across them [5]. Applied to Vietnam, the national value therefore depends on the share of travel that occurs under congested conditions. To construct this lower range, we assume that congestion costs arise only in Hanoi and HCMC and are negligible elsewhere, and distribute the two cities' combined losses over national VKT. At the same daily travel distances, a national fleet of approximately 77 million motorcycles [3] and 6.8 million cars [13] implies roughly 672 billion vehicle-kilometers per year, of which the two cities account for 22 percent. The resulting national average is 0.60 cents per mile. Since other urban areas experience at least some congestion, this value is a floor for the national average.

All VKT figures rest on registered vehicle stocks, which may include scrapped, idle, or never-deregistered vehicles and therefore exceed the number of vehicles in active use. Because congestion losses are fixed, overstating VKT understates each per-kilometer estimate, so the central value and both bounds are biased downward. The two cities' 22 percent share of national travel is also uncertain, since inactive registrations may be more common outside the major cities. On its own, this downward bias makes the resulting optimal tax conservative. It partially offsets, but is unlikely to fully counteract, the upward bias from relying on data from Vietnam's two most congested cities.

In all, this yields a national calibration range of: $0.60 \leq E^{C} \leq 2.85$ cents per mile. The central estimate of 2.76 cents per mile sits closer to the top of the range by construction, since it is measured where congestion is most severe. Nonetheless, it is a reasonable baseline because it is the most direct evidence available. We report results across the full range in the sensitivity analysis, where the lower bound shows how much of the optimal tax depends on treating urban congestion as representative of the country as a whole.

3.5. External Accident Cost E^{A}: 1.59 Cents/Mile

External accident costs represent the portion of crash-related damages that drivers do not fully internalize when making travel decisions. As Parry and Small (2005) emphasize, "most of these costs are not external: drivers presumably take into account the uninsured portions of risks to themselves and probably to other family members," but they do not account for broader societal impacts, including costs borne by unrelated third parties, emergency responders, or congestion from incident-induced delays [5]. Although

official Vietnamese statistics report aggregate economic losses from road traffic accidents, these figures largely include costs borne by the at-fault driver themselves, such as personal injury, property damage, insurance premiums, and legal liabilities. The optimal gasoline tax framework, however, requires the marginal external component of accident risk.

We construct a lower-bound estimate from a 2008 study prepared for Vietnam's National Road Traffic Safety Master Plan, which projects accident losses for 2020 in VND [14]. Converting this projection to USD using the 2020 exchange rate yields an annual loss approximation of USD 3.85 billion. Lastly, dividing by national VKT produces a lower-bound accident cost of approximately 0.91 cents per mile.

For the upper bound, broader national road safety assessments imply substantially larger accident-related losses of 19 billion USD [15]. That being said, because these estimates capture total economic costs rather than strictly external costs, we apply a conservative one-half scaling factor to approximate the accident costs borne by third parties or uncompensated victims (i.e. the portion not already internalized by drivers). This yields an external accident cost of approximately USD 9.5 billion annually, corresponding to an upper bound of 2.26 cents per mile.

Taking the midpoint of this range, we adopt $E^A = 1.59\ cents\ per\ mile$ as the central estimate for the baseline.

3.6. Gasoline Price Elasticity η_{FF}: -0.36

The optimal gasoline tax framework requires an intermediate-run price elasticity of gasoline demand, reflecting behavioral adjustments over approximately two to four years. Direct Vietnam-specific estimates of intermediate-run gasoline demand elasticity are limited. We therefore triangulate across three empirical sources and construct a weighted calibration.

First, Brons et al. (2008) provide a global meta-analysis of gasoline demand elasticities, reporting an average short-run elasticity of −0.34 across a large international sample [16]. This estimate benefits from broad statistical grounding and cross-country evidence but primarily reflects short-run responses.

Second, Lin and Zeng (2013) estimate China's gasoline demand elasticity using an instrumental-variable strategy to address price endogeneity, employing diesel prices as an instrument. Their intermediate-run elasticity ranges from −0.497 to -0.196, with a midpoint of approximately -0.35 [17]. Given structural similarities between China and Vietnam, notably income levels, high motorcycle usage, and regulated price adjustments, this estimate provides the closest institutional and behavioral analogue.

Third, as a plausibility check, we estimate a simple log-log regression between national gasoline consumption and retail gasoline prices in Vietnam for 2022–2023 [18][19]. This regression yields an elasticity of approximately −0.42. Because the time horizon is short and does not control for macroeconomic confounders, it is treated more as a validation of sign and order of magnitude.

To synthesize these anchors, we weight them according to the strengths and limitations noted above, assigning 0.50 to the China instrumental-variable estimate, 0.35 to the global meta-analysis, and 0.15 to the Vietnam log-log regression. The resulting calibrated elasticity is:

$$\eta_{FF} = 0.50(-0.35) + 0.35(-0.34) + 0.15(-0.42) \approx -0.36$$

For sensitivity analysis, we consider a sensitivity range of -0.50 to -0.20, spanning the empirical interval suggested by the literature.

3.7. Elasticity of VMT wrt Consumer Fuel Price η_{MF}: -0.60

We adopt η_{MF}= -0.60, based on down-adjusting China's estimated intermediate-run VMT elasticity range (−0.882 to −0.579) to reflect Vietnam's somewhat lower substitutability in travel. This lower substitutability arises because Vietnam's transport system is more heavily dependent on motorcycles, which offer limited alternatives when fuel prices rise, unlike China, where a larger share of commuters can shift to public transit or private electric vehicles. In addition, urban transport networks outside Hanoi and Ho Chi Minh City remain less developed, constraining travelers' ability to reduce driving without significantly cutting mobility altogether.

We place Vietnam's uncertainty within the upper (less negative) portion of Lin & Zeng's interval, reflecting the same substitutability logic:

$$\eta_{MF} \in [-0.70, -0.58] \subset [-0.882, -0.579].$$

3.8. VMT Portion of Gasoline Price Elasticity β: 1.67

We define $\beta = \frac{\eta_{MF}}{\eta_{FF}} = 1.67$. For any rise in the gasoline price, the percentage reduction in miles traveled is therefore about 1.67 times the percentage reduction in gasoline use.

Because $fuel\ use = miles\ traveled \times fuel\ used\ per\ mile$, the two elasticities are mathematically linked. When the gasoline price rises by 1%, miles traveled fall by 0.60% while fuel use falls by only 0.36%. If the two elasticities are directly comparable, they imply that fuel used per mile rises by approximately 0.24%. Put differently, the estimated reduction in driving alone would reduce fuel use by 0.60%, but higher fuel use per mile offsets 0.24 percentage points of that reduction, leaving a net decline in gasoline use of 0.36%.

This result differs from Parry and Small (2005), who adopt a central value of β = 0.4 for the United States [5]. The value above one in the present calibration offers little direct evidence that higher gasoline prices cause Vietnamese drivers to use more fuel per mile, since the two elasticities behind it were never estimated jointly for Vietnam from a single dataset or specification. The gasoline demand elasticity combines several empirical sources, while the VMT elasticity is derived from Chinese estimates [17].

Accordingly, $\beta = 1.67$ is best read as a calibration scenario, and its implications for driving and fuel efficiency in Vietnam remain uncertain.

Because the adjusted Pigouvian tax is highly sensitive to β, this parameter is a major source of uncertainty. Holding all other base-case parameters fixed, the total optimal gasoline tax is approximately 776 cents per gallon when $\beta = 1$ and 415 cents per gallon when $\beta = 0.4$. These alternatives remain roughly 17 and 9 times the current tax rate, respectively.

3.9. VMT Expenditure Elasticity η_{MI}: 0.05

This elasticity captures the percentage change in vehicle miles traveled (VMT) with respect to a 1% change in household disposable income. Its sign creates a source of ambiguity: while rising income may increase VMT through greater vehicle ownership and travel demand, it may also reduce VMT due to increased urbanization, improved public transit, and residential sorting that shortens commutes. In the absence of Vietnam-specific estimates, we draw upon regional proxies and contextual adjustments to derive a grounded approximation.

Lin and Zeng (2014) estimate a statistically insignificant VMT expenditure elasticity of -0.044 for China, attributing the near-zero estimate to opposing forces of income-driven motorization versus urbanization [6]. However, Vietnam's transport context suggests a moderately stronger income response. Compared to early-2010s China, Vietnam exhibits: (i) a lower baseline level of motorization, particularly car ownership, suggesting more scope for income-driven expansion in travel demand; (ii) a higher proportion of two-wheelers, whose usage is more elastic to income than that of already-saturated automobile markets; and (iii) weaker public transport networks outside Hanoi and Ho Chi Minh City, making income-linked mode shifts less likely to reduce VMT. On the other hand, Vietnam also faces severe urban congestion and rapidly rising fuel costs, potentially dampening travel growth.

Balancing these factors, we adopt a central value of $\eta_{MI} = 0.05$ for Vietnam, which is modestly higher than the Chinese baseline but still near zero. A sensitivity range of [–0.05, 0.15] captures the plausible variation to be used in the sensitivity analysis.

3.10. Uncompensated Labor Supply Elasticity ε_{LL}: 0.61

The uncompensated or Marshallian labor supply elasticity measures the percent change in aggregate labor supply when wages change by 1%, reflecting both substitution (higher wages increase the opportunity cost of leisure and encourage more work) and income (higher wages allow workers to consume more leisure while maintaining income) effects.

Pertinent data for Vietnam is lacking. However, a Federal Reserve Board working paper by Hoang, Mitra, and Pham (2024) finds that workers in Vietnamese manufacturing firms are paid only 54–58% of their marginal revenue product of labor, implying an average labor supply elasticity facing firms of roughly

1.2–1.4 [20]. This wage markdown is difficult to reconcile with a competitive labor market, where firms must pay workers close to their full marginal value or risk losing them to competitors offering more. Its persistence, instead, points to monopsony power. Frictions such as restricted mobility and segmentation across local labor markets limit outside options available to workers.

Firm-level and economy-wide labor supply elasticities are dissimilar conceptually. In a highly competitive labor market, a single firm faces an extremely elastic labor supply, whereas labor supply at the aggregate level is usually less responsive to reflect the changes of substitution and income effects across the whole population. That being said, this distinction blurs in monopsonistic or segmented labor markets, which are typical in developing economies. When workers face limited mobility, the same frictions that allow firms to costlessly underpay them also hinder them from responding to wage changes at the national level. They may be unable to relocate, transition to better-paying sectors, or adjust hours freely. Consequently, micro-level estimates remain useful even when macro-level data is absent.

To benchmark this against broader international evidence, we compare with Li and Zax (2003), who estimate an uncompensated labor supply elasticity of just 0.017 for urban China using structural methods [21]. This extraordinarily low value accords with the highly rigid labor institutions of early-2000s China, where state work-unit assignments, Hukou restrictions, and limited wage responsiveness constrained workers' ability to adjust labor supply.

In comparison, Vietnam's labor markets, especially since the Doi Moi reforms in 1986, have witnessed price liberalization and the reallocation of workers toward non-agricultural sectors. A Brookings study on the evolution of Vietnamese industry documents a decline in agriculture's share of total employment from 73.02% in 1990 to 56.8% by 2005, while industry and construction sector rose from 12.1 to 17.9% and services from 19.7 to 25.3% [22]. This shift demonstrates that Vietnamese workers were not fixed within rigid institutional assignments in the same way as their Chinese counterparts under Hukou restrictions. As new economic opportunities emerged, workers were able to move across sectors, giving Vietnam a labor market that responds more visibly to wage and opportunity changes.

Still, this reallocation has occurred largely outside the formal labor market, which tempers how much responsiveness this evidence alone may support. In 2000, only 9.4% of total working labor was in formal enterprises, and by 2013 this had risen to merely 22.15%, still less than one quarter of total jobs in the early 2010s [23]. This informality suggests that much of the aforementioned sectoral reallocation reflects workers moving between informal arrangements due to necessity and limited bargaining power, rather than firms actively competing for labor through wages. This reinforces the monopsony-like frictions already integrated in the firm-level evidence. Even as workers reallocate across sectors, such an informal market leaves employers with considerable wage-setting power, which dampens the extent to which reallocation translates into a pure wage-driven labor supply response.

Overall, this evidence illustrates a labor market more flexible than early-2000s China's, but still lacking full wage responsiveness due to continued frictions and informality. We therefore set Vietnam's uncompensated labor supply elasticity at 0.61, the midpoint between Li and Zax's estimate for urban

China's highly rigid labor market (0.017) and an upper bound of 1.2 from the firm-level range.

3.11. Compensated Labor Supply Elasticity ε_{LL}^{c}: 0.90

The compensated (or Hicksian) labor supply elasticity reflects the pure substitution effect of a wage change, holding utility constant. Unlike the Marshallian elasticity, the Hicksian elasticity abstracts from the income effect, isolating how strongly individuals substitute labor for leisure when work becomes relatively more rewarding.

Data on compensated labor supply elasticity are exceedingly limited for Vietnam and most developing countries. Therefore, we begin with the Chinese estimate of 0.997 reported by Li and Zax (2003), based on structural labor supply models for urban Chinese households [21]. Given the shared features of China and Vietnam, including transitional labor markets, high rates of informal employment, and relatively weak income-tax distortions, the Chinese compensated elasticity provides a credible starting point.

However, relative to China in the early 2000s, Vietnam's labor force remains more rural and more heavily concentrated in informal employment, which may moderate the degree of substitution between leisure and labor. As such, we modestly scale down the Chinese elasticity by ~10%, setting Vietnam's compensated elasticity at 0.90, with an uncertainty range from 0.80 to 1.00.

3.12. Producer Price of Gasoline q_F: 243 Cents/Gallon

The producer price of gasoline is calibrated as the average retail gasoline price in Vietnam over the twelve-month period from December 2024 to November 2025. Monthly price data are obtained from Trading Economics, which compiles official national gasoline price statistics.

Over this period, retail gasoline prices ranged from approximately USD 0.73 to USD 0.82 per liter, with a twelve-month average of approximately $0.76 per liter, equivalent to 288 cents per gallon [19].

Since pre-tax producer prices are not separately reported in Vietnam, the producer price q_F is approximated by subtracting the statutory tax wedge t_f^0 from the observed retail price, yielding $q_F = 288 - 45 = 243$ cents.

3.13. Initial Tax Rate on Gasoline t_f^0: 45 Cents/Gallon

Under current fiscal policy, the tax structure is dominated by the Environmental Protection Tax (EPT) and the Special Consumption Tax (SCT). Pursuant to the prevailing legislative framework, the EPT is assessed as a fixed absolute value of 1,000 VND per liter [24]. Complementing this, the SCT is applied as an ad valorem tax at a rate of 10% of the pre-tax base price. With a representative retail price of

approximately 20,000 VND per liter, the SCT component equates to an additional 2,000 VND per liter [25].

Summing these components yields a total specific tax wedge of 3,000 VND per liter, which converts to 45 cents/gallon.

3.14. Government Spending G: $40.23 Billion

Extracted from TradingEconomics, which compiles national accounts from the General Statistics Office (GSO) of Vietnam, government spending in 2024 is reported at 1,021,943.41 billion VND, equivalent to approximately $40.23 billion after conversion at the prevailing end-2024 exchange rate [26].

3.15. Labor Income L: $197.97 Billion

Labor income is constructed using workforce size and average monthly earnings for urban and rural workers in Q2 2025. Vietnam's employed workforce in Q2 2025 comprised 20.2 million urban workers and 31.8 million rural workers [27], for a total of 52 million employed persons. The GSO reports average monthly income for that same quarter of 9.9 million VND for urban workers and 7.2 million VND for rural workers [28]. These figures are subsequently annualized, summed across both segments, and converted at the prevailing Q2 2025 exchange rate, yielding L ≈ $197.97 billion.

3.16. Taxable Gasoline Sales $S(g)$: 2.69 Billion Gallons

Taxable gasoline sales are calibrated using national gasoline consumption data from the U.S. Energy Information Administration, which reports average daily consumption of approximately 174,805 barrels in 2024 [18], matching the reference year used for government spending in Section 3.14. Converting this to annual volume and expressing the result in gallon units yields total gasoline sales of approximately 2.69 billion gallons per year.

3.17. Tax Rate on Labor t_L: 0.1971

Within the model, the tax rate on labor t_L plays an indispensable role in both tax components. In the adjusted Pigouvian term, t_L determines MEB_L, which captures the additional deadweight loss due to raising government revenue through labor taxes. Because taxing gasoline also indirectly taxes labor, a higher t_L implies more severe existing market distortions, thereby requiring the Pigouvian corrective tax to be scaled down. In the Ramsey term, t_L measures the degree of distortion in the existing revenue system. As labor taxation becomes more burdensome, gasoline taxation emerges as a more attractive source of revenue, increasing the Ramsey component.

t_L is not directly observable as a single statutory rate. Vietnam levies progressive personal income tax at

marginal rates ranging from 5 to 35% [29]. In addition, both firms and workers contribute to social, health, and unemployment insurance: employers pay about 21.5% of the worker's gross wage and employees have a further 10.5% deducted from their wage, resulting in a combined contribution of roughly 32% of formal payroll on top of any personal income tax due at a given income level [30]. In practice, nevertheless, a substantial share of the workforce participates in the informal sector: 63.5% of employed workers in Q2 2025 hold informal jobs [27], and estimates suggest that the informal economy accounts for 15-27% of GDP [31]. Because informal workers often do not pay the full set of income tax and social insurance contributions, the economy-wide labor tax rate is lower than any statutory figure.

Following Lin and Zeng (2014) and Parry and Small (2005), t_L is derived from the government budget constraint, which requires that total revenue from labor taxation and gasoline taxation together finance government spending:

$$t_L L + t_f^0 S(g) = G,$$

where $t_f^0 S(g)$ corresponds to the term $t_F F$ in the model's original notation from Section II, with $S(g)$ denoting Vietnam's total taxable gasoline sales in gallons and t_f^0 denoting the current tax rate per gallon. Rearranging gives $t_L = \frac{G - t_f^0 S(g)}{L}$.

Substituting Vietnam-specific values calibrated in Sections 3.13 to 3.16 gives $t_L = 0.1971$.

IV. DISCUSSION

In accordance with Parry and Small (2005) [5], Table 1 reports the baseline results alongside one-at-a-time sensitivity analysis. Each row varies a single parameter to the low or high end of its calibrated range while fixing all other parameters at their base-case values, and presents the resulting adjusted Pigouvian and Ramsey taxes. Because β is defined as the ratio $\frac{\eta_{MF}}{\eta_{FF}}$, it is not varied independently during the sensitivity analysis but rather recomputed whenever either elasticity departs from its central value. The final two rows set all parameters simultaneously to their Low or High values and hence bound the optimal tax over the stated ranges.

Throughout the table, "Low" and "High" represent the parameter values that lower and raise the optimal tax, respectively. For most parameters, these coincide with the numerically smaller and larger values, but there are three cases where the direction reverses. First, since $\beta = \frac{\eta_{MF}}{\eta_{FF}}$ and both elasticities are negative, a more negative η_{MF} raises β at constant η_{FF}. The proportional reduction in miles traveled relative to the proportional reduction in fuel use then becomes larger, so each gallon of reduced fuel use corresponds to a

larger implied reduction in distance-related externalities. Of the two bounds of its range, -0.58 is the less negative value. It yields the smaller β (1.61, against 1.94 at -0.70) and thereby the lower tax, making it the Low value.

The second parameter exemplifying this idea is the VMT expenditure elasticity, which enters the Ramsey term through the factor $\left(1 - \eta_{MI}\right)$. Parry and Small demonstrate that when leisure is weakly separable in utility, travel is a relatively weak substitute for leisure provided η_{MI} is below one, which justifies taxing gasoline above other goods [5]. As shown in Section II, the Ramsey component is proportional to $\left(1 - \eta_{MI}\right)$. As a result, it shrinks as η_{MI} rises toward one, so a higher η_{MI} lowers the Ramsey tax. The numerically greater bound of this parameter, 0.15, is consequently the Low value.

Third, $MEB_L = \frac{t_L \varepsilon_{LL}}{1 - t_L\left(1 + \varepsilon_{LL}\right)}$ rises with the uncompensated labor supply elasticity ε_{LL}. Because the adjusted Pigouvian tax is divided by $(1 + MEB_L)$, a more elastic labor supply scales the corrective tax down further. It follows that the Low value of ε_{LL} is 1.2 while the High value is 0.017.

	Parameter Values			**Adjusted Pigouvian Tax Using Low and High Range Values (cents/gallon)**		**Ramsey Tax Using Low and High Range Values (cents/gallon)**	
	Base Case	Low	High	Low	High	Low	High
Initial fuel efficiency	105.84	102.25	110.25	975.3	1051.2	167.9	167.9
Pollution damages, local air pollution (cents/mile)	2.34	0.47	11.7	728.9	2413.2	167.9	167.9
Pollution damages, global climate change (cents/gallon)	7.03	0.23	28.1	1003.6	1027.3	167.9	167.9
External congestion cost (cents/mile)	2.76	0.60	2.85	685.4	1022.9	167.9	167.9
External accident cost (cents/mile)	1.59	0.91	2.26	907.4	1109.9	167.9	167.9
Gasoline price	-0.36	-0.50	-0.20	728.4	1812.1	120.9	302.2

elasticity							
Elasticity of VMT with respect to consumer fuel price	-0.60	-0.58	-0.70	975.9	1176.6	167.9	167.9
VMT expenditure elasticity	0.05	0.15	-0.05	1009.4	1009.4	150.2	185.6
Uncompensated labor supply elasticity	0.61	1.2	0.017	837.4	1182.2	167.9	167.9
Compensated labor supply elasticity	0.90	0.80	1.00	1009.4	1009.4	149.3	186.6
Producer price of gasoline (cents/gallon)	243	231	265	1009.4	1009.4	160.9	180.7
Adjusted Pigouvian tax (cents/gallon)	1009.4	165.8	6487.5				
Ramsey tax (cents/gallon)	167.9	92.1	399.5				

TABLE 1. Sensitivity Analysis of Adjusted Pigouvian and Ramsey Gasoline Tax Estimates Under Alternative Parameter Calibrations
Note: "Low" and "High" denote the parameter values that lower and raise the optimal tax, respectively. See Section IV for the methodology and for the three parameters whose Low value is numerically larger than the High value.

4.1. Interpreting the Optimal Tax Magnitudes

Table 1 indicates an adjusted Pigouvian gasoline tax of 1,009.4 cents per gallon and a Ramsey component of 167.9 cents per gallon. In total, these imply an optimal tax of approximately 1,177.3 cents per gallon, versus the current 45-cent statutory tax. With the magnitude of the Pigouvian tax substantially exceeding the Ramsey tax, this framework shows that the main distortion in Vietnam's gasoline market comes from unpriced externalities rather than from inefficient revenue collection.

The sensitivity analysis confirms these results are robust. When parameters are varied singly, the total optimal tax never falls below 849.3 cents per gallon, about 19 times the current rate. The lowest value arises when gasoline demand is most price-elastic, whereas the highest, 2,581.1 cents per gallon, emerges when local air pollution damages sit at their upper bound. Two cases merit attention. First, because the congestion estimate draws on Vietnam's two most congested centers, Section 3.4 constructs a lower bound that confines congestion costs to Hanoi and HCMC. At this bound of 0.60 cents per mile, the total optimal tax is 853.3 cents per gallon, still roughly 19 times the current rate. Second, testing the uncompensated labor supply elasticity at its bounds of 0.017 and 1.2, instead of relying on the midpoint 0.61, yields a total of 1,350.1 and 1,005.3 cents per gallon,

respectively, or 22 to 30 times the current rate. Notably, even when all parameters are set to their tax-minimizing quantities, the total optimal tax of 257.9 cents per gallon remains nearly six times the statutory rate.

This estimate should be read as a marginal benchmark from a second-best model that holds existing labor taxation and behavioral elasticities constant. The optimal tax condition equates marginal social costs under prevailing distortions. The results' magnitude comes from the model's structure and parameter choices, especially the conversion of distance-based externalities into per-gallon terms. The derived Pigouvian and Ramsey taxes do not claim that Vietnam should immediately impose a more than twentyfold increase in statutory gasoline taxes, but rather serve as evidence of substantial underpricing under the current tax structure. The divergence between statutory and model-implied rates largely attests to a considerable under-internalization of external costs.

4.2. Pigouvian vs. Ramsey Results and Their Alignment with the Vietnamese Context

Using the framework, the calibrated results indicate that the Pigouvian term dominates, accounting for 85.7% of the total optimal tax, while the Ramsey component is materially smaller. The primary driver for such results is the $\frac{\beta M}{F}$ multiplier in the MEC_F formula. Vietnam's fleet fuel efficiency of 105.84 miles per gallon (which, by comparison, is more than five times the US baseline used by Parry and Small of 20 miles per gallon [5]) means each gallon of gasoline generates an unusually large amount of distance traveled. Vietnam's calibrated β of 1.67 means that the model assigns a relatively large reduction in road use to each gallon of reduced gasoline consumption, although Section 3.8 discusses the uncertainty surrounding this value. Together, these two parameters significantly amplify the per-gallon conversion of distance-based externalities, producing a MEC_F sufficiently large that the downward adjustment from the $1 + MEB_L$ denominator limitedly tempers the Pigouvian term.

Within MEC_F itself, the distance-related term $\left(\frac{\beta M}{F}\right)\left(E^C + E^A + E^{P_M}\right)$ is approximately 1,180 cents per gallon against the fuel-related term E^{P_F} of only 7.03 cents per gallon, meaning distance-based externalities outweigh their fuel-based counterparts by a factor of roughly 168 to one. Among these, congestion is the largest single component, at approximately 487 cents per gallon or 41 percent of MEC_F, succeeded by local air pollution (413 cents, 35 percent) and accidents (281 cents, 24 percent). Vietnam's underpricing problem stems mainly from the externalities of road use rather than from fuel combustion. Although a tax on gasoline can still alleviate these negative effects, it does so only indirectly by making driving more expensive and thus reducing vehicle miles driven. A tax on miles traveled would address these costs more directly by charging for road use. In this way, the argument for raising gasoline taxes in Vietnam remains valid, but it becomes clear that the welfare benefits of such taxes mainly come from reduced road use.

The existence of a positive Ramsey tax also offers an insightful implication. Holding the government's total revenue requirement fixed, part of Vietnam's current reliance on labor taxation could, theoretically, be replaced by higher gasoline taxation, which would diminish the total deadweight loss the tax system imposes on the economy. Given Vietnam's calibrated labor tax rate of approximately 19.7% (Section 3.17), this reallocation shifts part of

the tax burden away from labor income, where taxation creates behavioral distortions, and toward gasoline consumption, which is relatively price-inelastic. This paper does not quantify the magnitude of such a substitution, since the labor tax rate is held constant throughout the model rather than solved in conjunction with the gasoline tax. Correspondingly, the Ramsey result is best read as evidence that Vietnam's current tax framework is inefficient at the margin in lieu of a direct prescription of how far labor taxes should fall.

Viewed alongside Vietnam's existing tax structure, the model's decomposition aligns imperfectly but still recognizably. Vietnam's EPT, levied per liter of consumption, maps to the Pigouvian rationale by targeting the environmental ramifications of fuel use. In contrast, the SCT resembles the Ramsey tax as a general revenue instrument. Nonetheless, both components fall well short of the magnitudes implied by the model.

4.3. Limitations and Political Feasibility

Although the results point to substantial under-internalization of externalities, several limitations must be considered.

First, the geographic scope of the parameters warrants discussion. Restricting the calibration to Hanoi and HCMC may align the congestion data with the geography they describe and focus the analysis on where distance-related externalities are most concentrated (and, by extension, where targeted local policies would have the greatest effect). Nonetheless, such a calibration is not feasible with current data. Most inputs, including fleet fuel efficiency, gasoline sales, government spending, labor income, and statutory tax rates, are available only at the national level. By contrast, congestion loss data exist only for the two cities, and several behavioral elasticities are drawn from Chinese or international studies. More importantly, Vietnam levies the EPT and SCT uniformly nationwide, so a city-specific fuel tax would merely invite drivers to refuel elsewhere. The national scope of this paper thus matches the policy instrument scrutinized, while the spatial concentration of congestion is better addressed through instruments such as congestion pricing or urban road tolls, which, unlike a fuel tax, can target peak-hour traffic and specific corridors. Future work with city-level data on vehicle fleets, travel, and fuel sales could extend the analysis to the urban scale.

Second, the congestion parameter carries particular uncertainty. Section 3.4's central value, drawn from the two most congested cities, likely overstates the national average, though even at its lower bound the optimal tax remains roughly 19 times the current rate (Section 4.1). The underlying loss figures are also contested. The HCMC Department of Transport has cited losses of about USD 6 billion per year (2022), press reports attribute USD 3 billion per year to Hanoi, and a 2024 seminar suggested USD 2-3 billion per city [32][33]. Yet, none of these estimates, including those adopted in this paper, is accompanied by a published, defensible methodology.

A simple magnitude check nonetheless favors the adopted figures. Dividing each reported loss by the total hours of delay it covers shows how much an hour in traffic must be worth for that figure to hold. We assume that every registered vehicle in each city loses the full annual delay reported by TomTom in Section 3.4. Because this overstates total delay, it understates the implied value of each hour and therefore favors the larger loss figures. Under this assumption, the adopted estimates imply that each hour of delay costs about three-quarters of what the average urban worker earns in an hour (Section 3.15). Transport agencies typically value time lost in traffic at

between half of hourly income for personal trips and all of it for work trips, as in the guidance of the U.S. Department of Transportation [34]. As such, the adopted figures fall within conventional practice. The USD 6 billion figure, by contrast, implies that each hour of delay would cost more than three times hourly earnings, a valuation that no conventional approach supports even under this favorable assumption. Moreover, since larger losses would only raise the optimal tax, relying on the lower figures is also conservative with respect to the paper's central conclusion.

In addition, accident costs are not entirely external. Section 3.5 scales down the upper-bound estimate to approximate solely the portion borne by others, yet this adjustment is necessarily imperfect, since the share of accident costs that drivers internalize is difficult to observe. The calibrated accident costs are therefore best read as conditional on the assumed degree of internalization.

Finally, political constraints limit the feasibility of large increases in gasoline taxation. In Vietnam, motorcycles are central to daily mobility for millions of households. A sharp spike in gasoline taxes would fall most heavily on households and workers whose livelihoods depend on daily motorcycle use, such as ride-hailing or delivery drivers, especially in urban areas with limited transport alternatives. The model does not estimate how higher gasoline prices would affect lower-income households differently from higher-income counterparts, nor does it account for the public resistance that a sudden increase in fuel costs could provoke.

Overall, these limitations suggest that the derived optimal tax should be cautiously viewed as a directional benchmark. In practice, moving gasoline taxes toward the levels implied by the model would likely require gradual implementation and complementary policies such as urban congestion management to remain politically and socially viable.

V. CONCLUSION

The findings indicate that Vietnam's current gasoline taxation structure captures only a limited portion of both the social costs and the revenue-efficiency potential of gasoline consumption. The total calibrated optimal rate of 1,177.3 cents per gallon is more than twenty times the current statutory rate of 45 cents per gallon. This qualitative conclusion is robust to the calibration choices. Across the one-at-a-time sensitivity tests, the total never falls below about 19 times the current rate, and setting β to one or to Parry and Small's value of 0.4 still leaves it roughly 17 or 9 times higher (Section 3.8).

Within the paper's result, the Pigouvian component dominates, constituting 85.7% of the total optimal rate. This dominance stems from the combination of an exceptionally fuel-efficient motorcycle fleet and a β exceeding one, which magnifies the per-gallon translation of distance-based externalities so strongly that they outweigh fuel-based damages by a factor of roughly 168 to one. As its central contribution, the paper reveals that congestion, accidents, and local air pollution (whose costs scale with distance traveled) explain most of the discrepancy between the current tax and the welfare benchmark. The case for higher gasoline taxation in Vietnam is therefore chiefly a case for pricing road use.

Under the model's assumptions, these results diagnose Vietnam's underpricing issue but do not imply an immediately realizable tax rate, for the reasons detailed in Section 4.3. Vietnam's existing tax instruments, the EPT and SCT, already mirror the roles of Pigouvian and Ramsey taxes, respectively, but fall well below their welfare-based counterparts. Future research would strengthen these findings by incorporating Vietnam-specific estimates of local air pollution damages, region-disaggregated congestion data extending beyond Hanoi and Ho Chi Minh City, and distributional analysis of how tax incidence varies across income groups. These improvements would make the benchmark less dependent on broad proxies and translate the model's insights into a feasible reform path.

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