

**TRADE IN SHADOWS: DETERMINANTS OF
UNDOCUMENTED FUEL TRADE
AND
ITS SOCIOECONOMIC FOOTPRINTS IN
PAKISTAN ECONOMY**



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I Muneeb Shah hereby state that my MPhil thesis titled TRADE IN SHADOWS: DETERMINANTS OF UNDOCUMENTED FUEL TRADE AND ITS SOCIOECONOMIC FOOTPRINTS IN PAKISTAN ECONOMY is my own work and has not been submitted previously by me for taking any degree from Pakistan Institute of Development Economics or anywhere else in the country/world.

At any time if my statement is found to be incorrect even after my Graduation the university has the right to withdraw my MPhil degree.

Date: 3/10/2025



Muneeb Shah

Dedication

This thesis is dedicated to all the icons of struggle for the rights of the people
From the **Pashtuns, Baloch, Gilgiti, and Chitrali** living in the North and West Frontiers
To the **Sindhi, Saraiki and Punjabi** living in the Centres

To my **Family**

For laying down their life struggling for a brighter future of their beloved son

To my **Teachers and Friends**

Without them I am nothing

To the the brave people of *Palestine*

Enduring imprisonment, exile, and suffering for the noble cause of freedom

To **all those**

who have given meaning and voice to the informal lives lived at the margins

To **Mehboo and Ari**

whose kindness and solidarity sustained me through this arduous journey

and **Myself**

for traveling the difficult terrains of the borderlands
and making sense of Undocumented Fuel Economies in our collective understanding

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Abstract

Pakistan grapples with a precarious undocumented fuel trade (UFT) conundrum. The Government of Pakistan has taken several measures to address the UFT conundrum. These measures, which have cost the government more than PKR 3000 million, include lighting the border, its physical fencing, and enforcing regulations on the movement of goods as well as on the people across the border. However, it has failed to solve the UFT conundrum. Based on utility, prospect theory, and trade theories, the study employs a multinomial logit model to identify critical factors influencing UFT participation as well as explores how UFT impacts provincial and national economies. The findings of this study suggest that UFT occurs due to multiple socioeconomic factors. It highlights that nearly 0.1 million individuals directly and 2 million indirectly rely on UFT, with daily cross-border fuel flows exceeding 11 million liters. The study highlights the importance of targeted interventions, including border markets, alternative employment opportunities, trade facilitation, and sustainable livelihoods, to encourage formalization and promote economic growth. It concludes that long-term strategies, incorporating education, financial inclusion, and structural reforms, are also essential for documenting UFT and improving socioeconomic outcomes in border regions.

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1. Introduction

Pakistan grapples with a precarious Undocumented Fuel Trade (UFT) conundrum, marked by recurring incidents at the western frontiers of its Balochistan province¹. Since 2016, the Government of Pakistan has taken several measures to address the UFT conundrum. These efforts include formalizing and regulating its undocumented trade while improving border management along its 909 km border with Iran.

These measures, which have cost the government more than PKR 3000 million, include lighting the border, its physical fencing, and enforcing regulations on the movement of goods as well as on the people across the border (Finance Division, 2021). Nevertheless, they have failed to address the UFT challenges. On the other hand, they have disturbed the livelihoods of people living in the border regions by limiting employment opportunities and contributing to economic instability and social unrest (Muhammad et al., 2022).

A considerable amount of literature with a multitude of theoretical frameworks is available on the formalization of UFT, examining its characteristics, determinants, and effects on both formal and informal economies worldwide. However, the domain of the UFT and its many counterparts are still in its infancy, particularly in developing countries like Pakistan (Najeeb, 2022). The literature suggests that the dynamics of the UFT are impossible to grasp unless the determinants of this trade and its socioeconomic footprints are adequately understood (Varavay, 2015). For this, detailed empirical work with adequate analysis of the legal, financial, non-financial, social, cultural, and geopolitical determinants and socioeconomic relationships between UFT and the economy, grounded in detailed empirical work, has yet to be undertaken.

Within this work, both monetary and non-monetary factors are significant, with greater emphasis placed on the former (Najeeb, 2022). The literature moreover suggests that implementing efficient policies to tackle UFT challenges involves, first and foremost, measuring its impacts and magnitude, finding ways to incentivize UFT formalization, and considering possible alternatives based on factors that influence individuals towards UFT.

The present study aims to advance the literature on Pakistan's UFT by exploring its underlying financial and non-financial socioeconomic determinants and footprints. This exercise, in essence,

¹ In this study, "fuel or oil" refers to High-Speed Diesel (HSD) and Petrol (also known as Gasoline, Motor Spirit (MS), etc.). These two fuels are selected because a major portion of an economy and supply chains depend on them (Romsom, 2022). The rest of the undocumented activities lie outside the scope of this research.

involves exploring the supply chain, critical determinants, or incentives that motivate individuals' engagement in UFT. Moreover, it aims to assess the impacts of UFT on both the provincial and national economies. Despite some commonalities, the determinants of UFT vary among individuals viz traders, agents, and drivers (Mir, 2024). This study adopts Bentham's (1843) utilitarian framework and utilizes a multinomial logit model to identify the significant determinants for each stakeholder or individual.

It shows that the decision to prefer these cheaper fuels over more expensive alternatives aligns with the Rational Choice Theory (RCT). While such financial incentives are important, they are not the only determinant of UFT. The Prospect Theory (PT), however, suggests that people's decisions are shaped by potential financial gains as well as by how choices are framed.

The findings of this study highlight that in Pakistan, as well as in Balochistan and Iran, individuals respond to a range of incentives, formal, informal, and those explained through RCT and PT frameworks, within multiple socio-economic constraints (Saleem, 2017). It shows that UFT asymmetrically correlates with the geography and culture of the Balochistan province, impacting the residents of the border region differently from the rest of the country.

Unlike other provinces of Pakistan, the economies of Balochistan and Iran are deeply interconnected due to their geographical proximity. Nearly one million people in Balochistan reside within 50 kilometers (KM) of the Pakistan-Iran border, with an estimated 200,000 households living in this area. Almost 2 million individuals rely directly and indirectly on UFT. Daily, around 11 million liters of undocumented oil flow from Iran to Pakistan.

Both the primary and secondary data provided in this study show that UFT has both concurrent and long-term effects in Balochistan. Similar insights were provided by the studies (such as Dadpay, 2020) Mozayani (2021)) conducted around the globe.

Additionally, multiple conclusions have been drawn from this study. Currently, due to critical fiscal constraints, both the provincial and federal governments may not possibly be able to sustain the livelihood of the Baloch population living in nearly half of Pakistan's geography and close the border at once (Muhammad, 2022), especially in a province with a one-seventh of the national population density. It requires a long-term effort to fully formalize and document UFT and improve broader socioeconomic outcomes such as income growth, employment creation, and poverty alleviation in border towns while incentivizing people towards the formalization of UFT. An optimal strategy would focus on stimulating the local economy as well as encourage and

incentivize a gradual shift from undocumented to documented trade. However, all this should be done based on the details about the UFT.

Finally, it concludes that there are no one-size-fits-all solutions. Improving access to education, accounting for informality when designing tax and social protection systems, and enhancing financial inclusion, can help the government to solve the UFT conundrum.²

1.1. UFT Definitions and Concepts.

UFT, however it is defined, often operates beyond the bounds of a country's formal economic framework (Swanson & Bruni-Bossio, 2019). Globally, oil remains a cornerstone of modern life, powering millions of vehicles across the world (IEA, 2023). Each day, more than 100 million barrels flow from producers to consumers, and within this flow, UFT accounts for nearly 7 percent of the global oil supply (Romsom, 2022).

There are multiple definitions of informality and undocumented trade (Harriss-White, 2014). Scholars broadly agree that economic informality exists along a multidimensional continuum. At its core, the undocumented economy encompasses activities that remain outside official records and state regulation. They are nevertheless embedded within broader non-state socio-political and institutional structures (Keshavarz & Khosravi, 2022).

The key aspects of informality that characterize UFT activities at the Pak-Iran border are characterized by un-documentation due to the clandestine nature of these operations. This allows the traders to minimize the risk of detection and interception (Ahmad, 2015). In Balochistan, in a joint informal setup, multiple border trade communities or committees issue tokens to help track the records of drivers and Zamyads (vehicles that carry and transport undocumented fuel). However, this informal mechanism is unable to document the amount of fuel traded daily. There exist some non-state mechanisms governing such transactions (Raheem, 2021). This secrecy can also sometimes help transfer contraband or black goods (Zafran, 2022).

Therefore, this study uses the term "Undocumented Fuel Trade or UFT" to describe Balochistan's border fuel economy. The term aims to capture its clandestine nature, reliance on informal governance, and absence from formal documentation. Meanwhile distinguishing it from other informal economic activities that are less embedded in cross-border trade systems.

² These findings are also a must-read for government officials and individuals interested in designing policies to create a more prosperous documented trade.

1.2. Contributions of the study

This study is one of the earliest scientific and quantitative study of its kind on Pakistan's UFT. As a result, the contributions of this study are manifold. First, unlike most recent studies carried out in Pakistan, this study is based on both primary data and secondary as well as on quantitative and qualitative data providing precise insights about determinants of UFT and its socioeconomic footprints as well as the size and supply chain of UFT in Pakistan. Secondly, based on RCT and PT the study employs a multinomial logit model to explore the critical determinants of UFT. This helps in highlighting the critical factors and allows for the presentation of consistent and accurate results. Third, it provides the intricacies of the business model of UFT, that is, how it transcends to the formal economy, its prices systems, and how it operates.

1.3. Statement of the Problem (SoP)

Undocumented Fuel Trade (UFT) in Pakistan persists as a significant issue. The government has taken multiple measures to solve the UFT conundrum and improve border management at its 909km Pak-Iran border. Nevertheless, they have failed to address the UFT challenges as well as disturbing the livelihoods of people living in the border regions by limiting employment opportunities. The lack of scholarly literature and knowledge on UFT's overall determinants, supply chain, and socioeconomic footprints leads to a cycle of resource wastage and regulatory inefficiencies. Without a clear understanding of the factors driving UFT and its socioeconomic footprints, controlling UFT becomes challenging. To address this knowledge gap, this research aims to investigate the following research problem:

“DETERMINANTS OF UNDOCUMENTED FUEL TRADE AND ITS SOCIO-ECONOMIC FOOTPRINTS IN PAKISTAN ECONOMY”

1.4. Questions & Objectives

Based on the stated research problem, the research objectives and questions of the study are as follows:

1.4.1. Research Objectives

This study aims to achieve the following two objectives:

- (1) to identify factors behind undocumented fuel trade due to which people choose undocumented fuel trade over other professions.

(2) to investigate the socioeconomic footprints of the undocumented economy and the possible role of these socioeconomic factors in the different parts of the undocumented fuel economy. Particularly in the ordinary life of people who are attached to it and in the whole economy in general.

1.4.2. Research Questions

Drawing insights from the area of international trade and the undocumented economy the following questions are formulated to explore the UFT of Pakistan.

- (1) What are the factors that influence the demand for undocumented fuel trade in Pakistan?
- (2) What socio-economic footprints do undocumented fuel leave on the residents and in the local economy, and how is its flow or supply maintained in Pakistan?
- (3) What is the volume of the Undocumented Fuel Economy of Pakistan?

In principle, this study aims to add to the body of existing literature on UFT by highlighting the determinants and socio-economic footprints of the UFT.

2. Literature Review

Chapter 2 critically assesses and synthesizes existing research on the Undocumented Fuel Trade (UFT). The motivation of this chapter is to develop a comprehensive understanding of the factors that sustain UFT and its broader socioeconomic implications, thereby informing the literature on UFT and border economies. This chapter is structured into three parts or subsections. Part 1 focuses on the determinants of UFT. Part 2 is on its socioeconomic footprints. Finally, Part 3 focuses on the techniques employed in UFT literature. Overall, the aim is to identify key themes while contextualizing Pakistan's UFT and its emerging trends and in the context of UFT globally.

2.1.1. Determinants of UFT

UFT has long been intertwined with local economies, particularly in border regions. After 1979, following the Iranian revolution, scholars such as Wang (1994) in Africa highlighted the major determinants of UFT. Power and energy policies, especially those related to oil prices and currency, play a crucial role in oil trade. The study emphasizes that incompatible pricing strategies contribute to a surge in UFT across borders.

Building on this, Weimar (2008) argues that inadequate and inconsistent enforcement mechanisms, especially in peripheral regions, create institutional gaps or vacuums that allow tax evasion and UFT. The study moreover states that weak governance and fragmented state presence enable UFT to become a normalized economic activity in border communities.

However, Karjanen (2012) stated that the flow and production of both documented and undocumented goods and services are intertwined. Hence, for a better understanding of the determinants, simultaneously exploring the whole of the documented and undocumented economy is important. The study depicted a significant role of illicit goods in the overall economic change that happened in the post-socialist economy, fostering marketization and commercial development at household and firm levels.

Within Iran, Varavay (2015) argues that despite increased spending on border control in Kermanshah province, the persistence of UFT underscores the inefficacy of government policies due to multiple financial incentives, weak enforcement capacity, and the profitability of cross-border fuel price differentials.

Mozayani (2021) explores the non-economic factors that influence UFT. The study's findings show that, despite being commonly viewed as an economic concern, UFT is a multidimensional

process with diverse non-economic origins, including social, cultural, political, and geographical factors.

Likewise, Raheem (2021) further expanded the UFT debate. It shows that both UFT and documented economy can work in parallel. The reliance of Balochistan's local population on cross-border trade is driven by kinship relations and the absence of formal economic opportunities in the Jiwani-Iran (Pak-Iran) border. The possession of Iranian identity cards (Sajjil) and dual nationality grants them advantages in conducting daily business. Moreover, border-crossing agreements (rahdari) facilitate frequent travel to Iran.

Zafran (2022) conducted a pioneering work on UFT and employed the utility theory to explore the determinants of UFT. The study finds that family involvement and constrained formal sector opportunities are factors driving individuals toward UE in Quetta.

Recent studies by Gallien (2021) and Khosravi (2022) reaffirm the multidimensional nature of UFT. It highlights that UFT is a transnational cross-border issue. Not only economic but also political and social factors of multiple economies come into play. These studies highlight the global interconnectedness of UFT, emphasizing that measures to control it require a holistic approach that addresses both market dynamics and transnational cross-border governance.

Muhammad Saleem (2022) also identified multiple determinants and socioeconomic factors related to undocumented trade at the 2,640 km Pak-Afghan border. The study states that the role of state and non-state actors is equally important in UE. Each new strategy adopted by authorities prompts a corresponding shift in tactics among smugglers, leading the government to focus on taxing and regulating profits from smuggling to better manage the market.

Boonsrinugul (2023) indicate that behaviors of the authorities, consumption patterns, and decision-making attitudes affect fuel stations significantly. Moreover, it states that UFT evolves with time. Different time periods need different station management measures to control UFT.

In conclusion, UFT is shaped by a range of structural, institutional, and contextual factors. Earlier studies emphasized economic and financial drivers such as pricing disparities, currency volatility, and weak enforcement mechanisms. However, the recent literature underscores the multidimensionality of UFT. It illustrates the interplay of social, political, cultural, market, and consumer behaviors, as well as geographical influences. This body of literature provides a strong motivation for this study by offering both theoretical insights and practical evidence on how and why UFT may persist across various contexts.

The literature highlights that as UFT occurs, prices of fuel play an important role. However, shipping and transportation, increasing risks associated with UFT, underdevelopment, geographical and social factors are also equally important.

2.1.2. Socioeconomic Impacts

Wang (1994) also highlighted the macroeconomic transnational impact of UFT. It discussed the transnational implications of undocumented cross-border petroleum trade between Nigeria and its neighboring West African countries, Cameroon and Benin. The implications include the distortion of regional fuel markets due to price differentials, loss in government revenue through tax evasion, and the undermining of formal trade channels. Subsidized fuel from one country into neighboring states creates artificial supply-demand dynamics and undermines the effectiveness of national energy policies.

In Pakistan, Sharif (2000) discusses the impact of UFT on the national economy, with a particular emphasis on its role in the agricultural sector. However, it primarily focuses on agricultural products, where undocumented fuel serves as an energy input. It suggests that formalizing this trade could enhance revenue collection through duties and taxes. However, the absence of detailed estimates on the volume of UFT or systematic evidence limits the study's contribution.

Supply chain analysis provides a structured lens to understand the flow of these impacts from origin to consumption. In the context of UFT, this approach helps trace the movement of fuel from cross-border procurement to end-user consumption, identifying key actors, linkages, and decision points. Ali (2010) emphasizes that analyzing informal supply chains requires attention to both logistical processes and the embedded informal institutions that facilitate transactions in the absence of formal regulation.

Khan & Yousaf (2021) argue that in SCA visibility depends on informal signals, word-of-mouth coordination, and risk-sharing strategies among actors. These networks often operate with remarkable efficiency despite lacking regulatory oversight.

Zafran (2022) takes the concept of an undocumented economy (UE) to the provincial capital of Balochistan, Quetta, and examines the dominant sectors of the UE. The study states that UE impacts the economy as a whole. It impacts the retail sector, transportation, fuel etc.

Muhammad Saleem (2022) describes border trade as an economic lifeline and emphasizes the adverse effects of strict border regulations on residents since a significant amount of population lives in the border region and connected to undocumented trade. It advocates for both short-term

and long-term policies, such as establishing trade corridors, creating employment opportunities, and striking a balance between security concerns and the economic needs of the local population. Najeeb (2022) highlights the significance of UE for local inhabitants and its socioeconomic impact on their daily lives. It also suggests that kinship relations as a social capital between cross-border communities lead to UFT at the Pak-Iran border.

Raheem (2021) The findings indicate that, the local economy heavily relies on the undocumented transfer of various goods, including drugs, fuel, and rationed food from Iran, as well as human trafficking.

In the Chaghi and Washuk districts of Balochistan, Muhammad Ehsan (2024) provides an in-depth analysis of the factors (such as underdeveloped infrastructure and regulatory barriers) contributing to the relatively low trade volume between Pakistan and Iran.

Faheem (2019) highlights that such analysis is particularly useful in border regions where state capacity is weak and informal governance structures dominate trade networks. By mapping out each stage of the undocumented fuel chain, from acquisition, transportation, storage, and resale, researchers can identify systemic bottlenecks, risks, and incentives driving participation.

Fahad (2024) states that in SCA the approach to SCA is important. It not only informs the operational dynamics of UFT but also sheds light on its broader socioeconomic impacts and resilience mechanisms. It is essential to explore the structural underpinnings of UFT and its embeddedness in local economic systems. The view of the participants towards the good is important. It is socially accepted or not.

Moreover, Acerbi (2024) notes that the fluidity of routes, seasonal variations in demand, and the presence of intermediaries add layers of complexity to UFT supply chains. In SCA, researchers capturing these realities are important. They can offer policy insights that are grounded in the lived practices of border economies.

2.1.3. Contemporary techniques used in UFT

Methodologies used to study UFT are essential since they determine the reliability, depth, and scope of the findings. Given the hidden and sensitive nature of undocumented trade, the research approach affects how accurately the phenomenon is captured (Chang et al., 2019).

Wang (1994) employed proxies such as the oil price ratio, exchange rates, public finances, and government monetary aggregates to explore broader economic distortions, particularly fiscal imbalances. In Pakistan, Sharif (2000) however criticizes this approach of using proxies for

exploring undocumented economy (UE). The study uses primary data via personal observations to explore UE on both the Iran and Afghanistan border to estimate Pakistan's undocumented trade balance with Afghanistan and Iran. Moreover, interviews were conducted from the experts to further explore the intricacies of the UFT.

Jane (2005) conducted a study on the undocumented economy along the Benin and Nigeria border using multiple linear regression to assess how supply and demand differentials influenced the scale of undocumented trade. The study found that lower prices in Nigeria significantly encouraged cross-border trade.

In contrast, Sneider (2006) argues that the reliance on purely economic variables failed to capture the broader socio-political and institutional dimensions of the undocumented economy. It critiques the broader use of linear regression models for informal economies, arguing that such models are unsuitable due to the presence of multiple overlapping drivers and non-linear outcomes that define informal and undocumented practices globally.

In the USA, Weimar (2008) introduced multiple microdata-based methods to quantify State Motor Fuel Tax Evasion (SMFTE) rates to address the issue of tax evasion in different regions of the USA. The study used data about the amount of fuel a car carries and the number of vehicles used, passing from a toll point, for the SMFTE.

Later, Karjanen (2012) in Slovakia, by employing a survey-based microeconomic commodity supply chain analysis. The study emphasizes the routes through which undocumented fuel flows, primarily toward Afghanistan, Iraq, and Pakistan-demonstrating the cross-border nature of this issue.

Varavay (2015) employs a survey-based approach, highlighting the role of corruption, price disparities, and subsidies in fueling this trade. The study collected micro-level primary data collected from border communities in Iran's Kermanshah province. It applies descriptive statistics to compare households engaged in UFT with those that are not. Through this comparative analysis, the study finds that households participating in UFT experience higher short-term incomes, largely driven by structural economic vulnerabilities and limited formal employment opportunities in the region.

Ahmed (2020) conducted a study on undocumented economy in India, using a logistic regression model. The study uses secondary data from district-level economic surveys and attempted to correlate UFT intensity with distance from the border, price gaps, and average household income

of documented and undocumented. The findings suggested a strong association between smuggling and economic deprivation.

Mozayani (2021) follows a descriptive-analytical approach. However, the study uses secondary data to, on average, import tariff Rates of the main commodities imported into Iran. Rather than focusing on household-level economic incentives, the study underscores the multidimensional character of smuggling by integrating national and international perspectives, emphasizing the influence of non-economic drivers such as cultural norms, political instability, and geographic disparities.

Raheem (2021) while employing qualitative methods (purposive sampling and interview guides), explores the motivations and practices of individuals engaged in UE. It highlights that UE requires grounded work. The traditional linear cause and effect relationship based on experimental modeling can't identify the intricacies of the UFT.

In Paroom (Balochistan), Najeeb (2022) applied Pierre Bourdieu's "Theory of Capital" to investigate the functionality of undocumented trade and the challenges encountered by border communities. The study employs a structured interview guide to capture insights and observations from the field survey.

Mengstu (2023) criticises the use of linear and binary logistic regression models. Employing a multinomial logit model, Mengstu (2023) examines the critical factors that affect the informal market outlet selection are analyzed using a random sampling technique. Quantity of cum harvested, silviculture management practice, the experience of individuals, land size, family size, availability of marketing outlets are the major determinants that affect the choice of the made in UE.

In Iran, Boonsrinugul (2023) employed grounded theory to investigate UFT in Songkhla Province with a focus on fuel retail outlets. The study proposes a risk management model to control UFT.

Muhammad Ehsan (2024) employing qualitative research methods, the study adds further determinants to the literature on bilateral trade. It finds that current regulatory practices require significant upgrades to meet global benchmarks.

Recently, Younus (2024) highlighted that, in 2024, high inflation, energy prices, criminal-militant networks, and political uncertainty are still significant determinants of UE. The study argues that, among others, black market goods are still a significant determinant of UE. These goods have a

global supply chain. Thus, Pakistan, Iran, Afghanistan, and their international partners should make a comprehensive effort to control UE.

The review of methodologies used to study UFT depicts an evolution from simple economic proxy models and linear regressions toward more new approaches that capture the complex socio-political, institutional, and cross-border dynamics of the phenomenon. Recent research uses qualitative and quantitative methods, micro-level and macro-level data, and multidimensional factors beyond purely economic incentives. This shift reflects growing recognition that understanding and addressing UFT requires integrated frameworks that consider local realities, broader governance challenges, and transnational influences to develop effective control.

2.1.4. Summary of Literature Review

The literature review explores the evolution of literature on UFT and its various determinants and impacts. It highlights key studies that reveal the complex nature of UFT, influenced by factors such as government policies, pricing strategies, and socioeconomic conditions. Notably, research indicates that UFT has significant implications globally, with specific findings from Pakistan, Iran, and the USA. In Pakistan, there are relatively limited theoretical studies on UFT. UFT reportedly affects local economies and presents opportunities for a stable society through formalization. Factors like corruption, price disparities, and kinship networks push individuals toward UFT, particularly in regions like Balochistan. Overall, the literature underscores that UFT is a multifaceted phenomenon stemming from both economic and non-economic factors, necessitating comprehensive approaches to address its implications effectively.

2.1.1. Research Gap

Due to its significant global presence, politically, socially, and economically, UFT is still an important contemporary aspect of the global economic paradigm. An interplay of monetary and non-monetary determinants attracts individuals towards UFT. Moreover, any hamper in international trade results in undocumented channels of international trade as in the case of Pakistan and Iran.

In Pakistan, there are relatively limited theoretical studies on UFT. Sharif (2000) and Zafran (2022) are valuable contributions to the literature on both UE and the UFT, as the latter is an intrinsic part of the former (Harriss-White, 2003). Nevertheless, both studies had their limitations. Sharif (2000) main focus is on agricultural products while Zafran (2022) only focused on the 3 markets of Quetta city. Moreover, a lack of detail is provided regarding the quantification of petroleum products, as

both studies (due to the lack of secondary data) primarily rely on personal observations and interviews to estimate the quantity.

In Pakistan, however, new patterns within Pakistan's UFT have emerged (Division, 2021). These patterns have not only expanded the size of the UFT but changed the mode and structure of the undocumented economy itself (Younus, 2024). From Iran, everyday thousands of Zamyads vehicles, Ships, and Khaiks (Boats) carrying a significant quantity of undocumented goods enters Pakistan (Ehsan, 2024).

Notwithstanding, numerous socioeconomic footprints of UE and its determinants already discussed in the literature by various worthy scholars, this study aims to explore the UFT-related determinants and give a broader picture of the UFT by blending both micro and macro level footprints in the economy as well as how UFT transcends into metropolitans of Pakistan.

3. Theoretical Framework

Traditionally economic growth is seen to be complemented by a decline in the undocumented sector. However, in multiple developing countries, the informal sector remains a persistent phenomenon despite significant economic growth in recent decades (Gary, 2023). As a result, contemporary literature considers both formal and informal trade activities to be essential for a country's economic well-being.

Factors that influence the decision to engage in these trade activities are the primary determinants of undocumented activities. These factors guide these decisions and have multiple socioeconomic impacts on the economy. Fundamentally, they act as the driving force behind informal trade activities like UFT. This chapter provides a theoretical perspective on these issues, linking trade theories, utility theory, and prospect theory to the understanding of undocumented trade³.

3.1. Trade Impacts an Economy

Initially, based on the theory of protection, mercantilist scholars in the 16th century advocated for a favorable balance of trade. Such scholars argue that a country should always keep the balance of trade in surplus. That is, the value of its goods (exports) surpasses the overall value of its imported goods. However, such surpluses often lead to unintended consequences, such as the growth of informal or undocumented economies and inefficient resource allocation (Smith, 1776; Britannica, 2024).

In modern economies, the phenomenon of the undocumented economy (UE) was first discussed by Smith (1776) in the famous book "An Inquiry into the Nature and Causes of the Wealth of Nations", also known as WON. In the late 18th century, Smith challenged the mercantilist ideas and highlighted the inefficiencies of government intervention that discouraged imports (Salvatore, 2019). Moreover, Smith (1776) stated that duties on commodities provoke undocumented trade. The book proposed "the theory of absolute advantage" based on the "labor theory of value" in international trade.

The theory states that countries should produce those commodities that they can produce more efficiently, with fewer resources or labor, than other countries. This will result in mutual benefits via trade as both countries will save their labor and resources and can enjoy cheaper goods.

³ Both international trade theories and decision-making theories, Utility, and Prospect theory, are interlinked. However, in this study, international trade theories focus more on socioeconomic footprints. Meanwhile, utility theory and prospect theory are more concerned with individual decision-making.

However, WON does not discuss UE in particular, but in general, in the context of political economy and custom procedures only, and details about the causes and nature of this activity are not provided in the book.

Building upon Smith's ideas, David Ricardo, in 1817, further expanded the understanding of international trade with the "theory of comparative advantage". In the "Principles of Political Economy" Ricardo suggested that countries should focus on exporting goods in which they have a relative cost advantage (Krugman & Obstfeld, 2009).

Later, in the 20th century, economists Eli Heckscher & Ohlin (1919) contributed to developing the Heckscher-Ohlin (HO) model by emphasizing the connection between factor endowments and trade behaviour. The HO model argued that trade and factor mobility would equalize factor prices between countries; wages and returns on capital would equalize across nations as factors of production moved to areas where they were relatively scarce.

The Specific Factor model (SFM) was introduced in continuation of the H-O model by Samuelson (1971). SFM states that differences in resources cause countries to have different relative supply patterns and thus become the reason for international trade. Moreover, Samuelson provided empirical pieces of evidence of the H-O model.

The crux of the above discussion, as well as empirical literature, is that trade is a counterpart of the economy. Multiple factors lead to trade, and this trade has overall socioeconomic impacts on an economy and on its multiple sub-parts (employment, growth, imports, exports, etc.).

3.2. Individual decision-making as the determinant of the Undocumented economy

Theoretical understandings behind the informal decision-making and the determinants of undocumented economies were first provided by Allingham & Sandmo (1972). Allingham stated that individuals make informal decisions, such as participating in the undocumented economy, if the benefits are higher than the risks associated with this activity.

This perspective is considered to be the predominant explanation for participation in the undocumented economy (Williams & Bezeredi, 2017). Individuals make decisions based on perceived costs and benefits, aiming to maximize utility or profit (as the utility can be better measured using monetary values or profit). These theoretical understandings are based on Rational Choice theory (RCT). RCT suggests that individuals engage in informal activities when they perceive the benefits, such as profit or access to goods, to outweigh the potential costs, such as legal sanctions. In many instances, individuals compare alternatives.

They do not follow the law if the price of following the law is not greater than the price of not doing so. For instance, if the benefit of breaching a contract or law is \$800 and the monetary reparations that the breacher can anticipate paying to another individual are \$500, then there is likely to be a breach of contract. An overview of the RCT is provided here:

Bentham (1843) laid the foundations of rational decision-making or the utilitarian framework by stating that individuals make rational decisions intending to maximize their benefits. Building upon Bentham's utilitarian framework, John Stuart Mill (1863) later employed a utilitarian framework for understanding human behavior and decision-making in the context of social sciences, economics, and overall societal welfare. The framework states that individuals pursue or aim to maximize utility, typically seen as happiness or pleasure, and minimize pain or suffering. Based on Mill's utilitarian perspective scholars tend to define the behavior of individuals who engage in economic activities when they perceive it to be advantageous in terms of maximizing their utility, even if it may conflict with societal norms or legal regulations. The main difference between Mill and Bentham was that Mill said that utility or happiness cannot be measured, while Bentham stated otherwise.

Building upon Mill's utilitarian framework, Vilfredo Pareto (1896) provided a detailed rational choice theory (also known as RCT). Pareto stated that the concept of rational decision-making is based on self-interest and utility maximization. Vilfredo Pareto argued that individuals make rational choices by weighing the costs and benefits of different alternatives and selecting the one that maximizes their personal utility. Consequently, these choices determine the outcome of individual decisions. Throughout the 20th century, based on RCT, the intuition behind multiple economic factors and decision making were simplified.

UFT is often attached to the characteristics of the RCT as the prices of undocumented fuel are less than the documented or legally imported fuel, thus making UFT a rational decision for the participants to maximize their profit, specifically in countries where government institutions such as law enforcement agencies are weak and unable to enforce legal contracts meticulously (*ceteris paribus*) (Allingham & Sandmo, 1972).

Later, multiple studies show that the share of monetary motive in describing undocumented economy determinants is not the only one. Globally, 70% of monetary purchases was among the several reasons motivating individuals to the unofficial markets while in developing countries the share was 30% (Williams & Bezeredi, 2017). There are other determinants involved such as the

failures of the formal market provision or the aim of pursuing multiple societal needs, resource misallocations, institutional inefficiencies, voids & weaknesses, powerlessness & instability, uncertainty, community building, peer & social relationships, and family contracts (C. Williams, 2017). While RCT offers insights into decision-making processes, it overlooks some additional factors such as behavioral anomalies. It often fails to address why this phenomenon happens more in developing countries as compared to developed countries (Arsovska, 2008).

In 1979, building upon RCT, Kahneman and Tversky (1979) further enriched the literature of decision-making, particularly in the field of undocumented economy, by proposing their Prospect Theory (PT). PT states that an individual's decision does not solely depend on expected utility or profit but on the available reference points. It states that options or references among risky prospects exhibit several ubiquitous effects. Individuals exhibit loss aversion characteristics and evaluate outcomes relative to reference points. On the contrary, they show risk-seeking behavior to avoid any losses; they frame decisions relative to a reference point.

The marginal utility of an individual decreases as the outcome of a decision deviates from the reference point that an individual sets. Thus, individuals take risks when they are performing below a reference point. For instance, for an individual for whom a reference point is poverty, he or she will engage in UFT (a risk-seeking behavior) for uplifting his or her living standards (Barberis, 2013; Chestnut, 2007; Kahneman, 1979).

Both Utility theory and Prospect theory provide a deeper understanding of the determinants of undocumented activities like UFT, illegal migrations, gambling, etc. Insights from the studies discussed above in the literature review, particularly those exploring determinants & socioeconomic footprints, enrich the understanding of the multifaceted nature of UFT. Based on the above literature review and the theoretical framework, the following conceptual framework is provided to explore the UFT of Pakistan.

3.3. Conceptual Framework

Several scholars underscored the profound impact of trade dynamics on an economy, from the classical mercantilist theories to modern theories of international trade. However, this trade depends on multiple socioeconomic factors or determinants such as income, price levels, kinship relations, distance to borders, etc. This segment aims to provide the conceptual framework of the study while outlining the factors driving participation in UFT along the Pakistan-Iran border. It also provides the broader socioeconomic impacts of this trade on local and national economies.

Additionally, it aims to identify the key variables or concepts relevant to the UFT and explain their roles by examining the underlying determinants driving the frequency of UFT. Finally, it offers insights into the socioeconomic footprints of UFT in the economy. Understanding these multifaceted factors that shape this phenomenon is imperative for a comprehensive understanding of UFT.

This section explores three of the conceptual framework components/subcomponents:

A) Determinants of UFT. B) Type of UFT Trips. C) Socioeconomic Footprints in the Economy.

3.4. Determinants of Undocumented Fuel Trade (UFT)

UFT (Undocumented Fuel Trading) is shaped by a mix of utility-based and prospect-theory-based factors. From a utilitarian perspective, individuals engage in UFT as a rational response to structural constraints. Higher relative wages, lack of formal employment, and supportive kinship networks make participation economically and socially rewarding. Geographic proximity to the Pak-Iran border and vehicle ownership further increases the perceived net benefits of UFT. Weak enforcement and local volatility moreover reduce its perceived risks. However, Prospect Theory suggests that individuals do not make purely rational calculations. They evaluate choices in terms of gains and losses relative to a reference point. In marginalized border regions where formal opportunities are scarce, UFT is perceived as a gain compared to unemployment and poverty or subsistence income, whereas abstaining from it represents a loss. Thus, UFT emerges both as a rational livelihood strategy and as an anchored choice shaped by how individuals perceive and weigh risk, loss, and survival with respect to their reference point. Details of these factors are provided hereunder:

Proximity to the Border: Living close to the 909 km-long Pakistan-Iran border facilitates easier access to fuel smuggling opportunities, making the trade less risky and more feasible.

Economic Instability: In areas with significant economic turmoil and weak governance, UFT emerges as a survival strategy, helping families maintain their livelihoods amidst chaos.

Higher Earnings: UFT typically offers greater financial returns compared to scarce formal employment options in the region, motivating individuals to participate, especially when other job opportunities are minimal.

Household: Larger families are often more involved in UFT to support their livelihoods. Factors like family size, dependency ratios, and income need significantly influence participation levels.

Occupational Risks: Risks associated with trade, such as accidents and hazardous working conditions, affect both the frequency of involvement and long-term participation sustainability.

Lack of Jobs: The high unemployment rates in border areas, such as Balochistan, push individuals towards informal economies like UFT, making it a viable alternative for earning a living.

Vehicle Access: The ownership or availability of Zamyad vehicles. Commonly used for UFT, is critical, as it directly impacts the capacity to transport fuel.

Frequency of Trips: The number of UFT trips individuals can make each month is influenced by market demand, vehicle availability, and their personal capabilities.

Social Networking: Kinship relations and social networks play a role in participation in UFT. It provides the necessary trust and support within these undocumented trading systems.

Market Demand: A consistent demand for cheaper fuel, particularly in areas lacking formal fuel supply networks, drives UFT, as local needs often exceed official supplies.

Together, these factors create a complex landscape where undocumented fuel trading becomes a means of survival and income generation for many individuals in border regions.

Type of UFT Trips

The Determinants of UFT and its characteristics decide the type of UFT trips chosen by individuals. In UFT, they make multiple trips per month, and the types of these trips are shaped by the stated determinants such as vehicle access, economic returns per trip, and the border situation.

Socioeconomic Footprints in the Economy

The fuel supplied by these trips UFT has socioeconomic impacts for individuals involved and the broader local and national economies. These impacts can be summarized as follows:

Local Economy: UFT supports the local economy by providing an alternative income stream, particularly in border areas where formal job opportunities are limited. It ensures cash flow and circulation, keeping local businesses active.

Living Standards: Participation in UFT can impact the standard of living for those involved, offering income that supports basic household needs, including education, healthcare, and food security.

Socioeconomic Stability: By providing income opportunities in areas with little formal employment, UFT contributes to local socioeconomic stability. It offers a form of resilience in the face of economic adversity, particularly in underdeveloped regions like Balochistan.

Food Security: The income generated from UFT helps to ensure food security for many households. Without the financial benefits of UFT, these households may face food insecurity.

Labor Force: UFT provides employment for a significant portion of the labor force, including not just drivers but also those involved in related services (such as vehicle repair, storage, and logistics). This trade helps reduce local unemployment.

Price Levels, Cheaper Fuel Sources, and Employment: The availability of cheaper fuel from UFT impacts local price levels by lowering the cost of transportation. This can contribute to reduced inflationary pressure in certain areas. UFT also provides affordable fuel source for locals, particularly those who cannot afford to purchase fuel at official prices. Beyond the direct involvement in UFT, UFT generates employment opportunities in auxiliary services such as logistics, oil tankers, and small-scale distribution networks.

Increased Mobility and Cross-Border Connectivity: The availability of cheap fuel enhances mobility, allowing people to travel for work and trade that help in the progress of their economic prospects and access to services. UFT also fosters informal economic ties between border communities in Pakistan and Iran.

Trade Volume: UFT increases the volume of trade between Pakistan and Iran, even though this trade remains undocumented. It is a significant part of the informal economy in the region.

Trade in Services: UFT supports trade in related services, including transport, repair, and informal financial transactions, expanding the scope of local economies beyond just fuel trade.

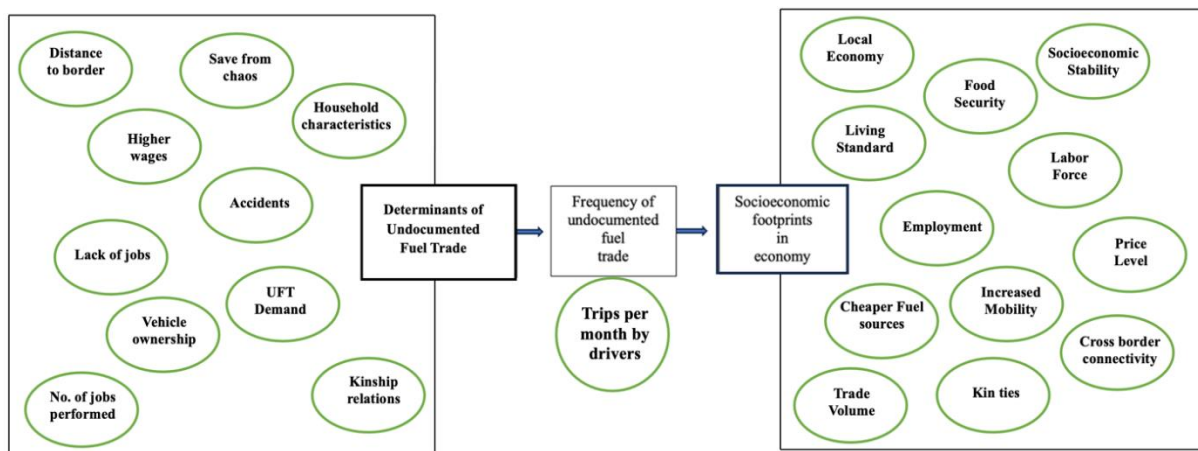


Figure 1: Conceptual Framework

Source: Author's based on (Adams et al., 2007)

This conceptual framework provides a structured understanding of the determinants of UFT, the Type of Trips by those involved, and the socioeconomic footprints left by UFT. The framework

highlights how socioeconomic constraints and incentives drive UFT. This chapter concludes that multiple factors influence the decision to engage in UFT and leave multiple socioeconomic impacts on the economy.

Theoretical grouping of socioeconomic factors

A more theoretical grouping of these factors and they relate to the trade and utility and prospect theories is as follows:

In PT, specific bank marks or reference levels play an important role, unlike in utility theory. For example, risk perception, loss aversion, and uncertainty handling can play an important role in UFT. Save from chaos and Accidents show loss aversion in uncertain environments. Moreover, Household characteristics particularly when shaped by vulnerability or dependency. E.g. Kinship relations, Lack of jobs and Distance to border acts as social safety nets under uncertainty.

Additionally, socioeconomic stability acts as a shield against perceived or potential economic downturns. This aligns with the desire to avoid losses rather than pursue gains. Living standard can be seen as a relative concept, framed as a gain only when compared to a previously lower condition rather than an absolute improvement. Cross-border connectivity represents informal risk-sharing mechanisms that emerge in response to uncertain environments, particularly in border regions with weak regulatory enforcement.

In contrast, under Utility Theory, decisions regarding UFT and its economic footprints are viewed through the lens of RCT, where individuals and households aim to maximize their overall benefits. For instance, the frequency of trips per month can be interpreted as an outcome of both RCT and PT optimization. That is based on balancing profit with time, risk, and resource use. The regression model in this study explores this optimization behavior, examining how an increase in a given factor may increase or decrease the probability satisfaction or benefits derived from UFT, thereby influencing whether an individual continues, reduces, or exits such participation. Ultimately, these micro-level decisions generate observable socioeconomic footprints in the form of UFT across border economies.

4. Methodology

This study aims to highlight the determinants that influence the demand for undocumented fuel trade (UFT) in the border areas of Pakistan, the socioeconomic footprints that UFT leaves on the people involved directly in UFT, and indirectly on the people living in the vicinity of UFT. It examines both the micro-level effects on residents and the macro-level effects related to the overall volume of UFT in Pakistan. Ultimately, the research seeks to estimate UFT's contribution to the national and provincial economies of the country.

For this, a clear emphasis on “what methodological approach is most suitable for identifying the determinants of UFT, and how can the socioeconomic impacts be systematically measured? “How does the chosen methodology capture both the direct and indirect socioeconomic footprints of UFT on the surrounding communities? and “In what way does the study's approach to quantifying the quantum of UFT and analyzing its supply chain offer reliable insights into the trade's broader impact? is important. This chapter aims to address these questions.

4.1. Research Design

To explore the impact of UFT, researchers (such as Zafran (2022), Najeeb (2022) and Raheem (2022) have used descriptive research designs. They have employed descriptive analysis to give summarized details of the socioeconomic footprints of the informal economy on the local economy. However, studies that aim to identify UFT determinants have employed experimental designs [such as David (2014)]. They have used multiple models to analyze the determinants of UFT by treating determinants as independent variables and choices made as dependent variables.

Based on the literature, this study integrates both descriptive and experimental designs with a focus on UFT determinants and their socioeconomic footprints.

An experimental design is used to find causal relationships. This research design explores why certain phenomena occur. In doing so, it explores the impact of independent variables on dependent variables while controlling other factors.

The descriptive research serves to outline phenomena without investigating causal relationships, making it useful for establishing baselines in areas with limited prior knowledge (Adams, 2007). This approach helps to illustrate the extent of UFT and its socioeconomic impacts on the local economy (Sadeghi et al., 2014).

In this study, using a questionnaire, primary data was also collected. For this, the questionnaire of this study was based on the available provincial development socioeconomic indicators, such as

those provided in the Pakistan Social and Living Standards Measurement (PSLM). Questions related to the number of visits by fuel traders, “what factors motivate them, and what socioeconomic footprints UFT leaves” were asked.

Finally, KIIs with UFT drivers as well as help from ethnographic research designs, were used to explore the supply chain of UFT. In the supply chain analysis, while traveling with multiple drivers and employing descriptive or experimental designs was difficult. Hence, the focus was on the interviews.

Cronbach’s alpha (a common statistical measure) is used to assess a scale or test’s internal consistency and reliability of the data collected. It quantifies the extent to which items within a scale consistently measure the same construct (Griffin, 2009). C-alpha was used in this study for internal consistency and reliability of the questionnaire. It provides a numerical indication of reliability. However, a more robust indication of reliability is the generalizability and alignment of the findings. In this study the findings are compared and presented with provincial and national demographic characteristics, which may lend greater credibility to the results.

The integration of both descriptive and experimental research designs in this study emerges as a suitable approach given the complex and multifaceted nature of UFT. Descriptive methods are essential for mapping the scale, characteristics, and socioeconomic impacts of UFT in under-researched areas, particularly where baseline data are sparse.

At the same time, experimental designs allow for a deeper exploration of causal linkages between specific determinants and participation in UFT, offering insight into why individuals engage in UFT practices. The inclusion of ethnographic tools increases contextual understanding, particularly regarding the supply chain dynamics that are often missed in survey-based methods alone. This mixed-method design provides a comprehensive framework for examining UFT by aligning methodological rigor with local contexts and maintaining consistency through tools such as Cronbach’s alpha.

4.2. Research Strategy

This segment discusses the research strategy (how this research was carried out) adopted to carry out the study or. This study focuses on understanding the determinants and the footprints of the UFT, and the chosen research strategy for this research is provided here.

For this study, both primary data and secondary data were collected from the border districts of Balochistan, viz. Chaghi, Washuk, Panjgur, Kech. In Pakistan, UFT also occurs in Gwadar District.

Gwadar is not included in this study since trade in the Gwadar region primarily involves sea trade. The sea trade operates differently from land-based trade. It relies on Khaiks (small boats) that transport fuel to Zamyads (vehicles). Details of the Khaiks are not available since this trade is entirely undocumented. Unlike vehicles from the other four districts, which are at least registered, boat-based trade and similar shadow activities (at some points of Kech district) operate without any form of record. Moreover, such trade does not follow any specific or predictable pattern. The volume and value of this trade are relatively small. As a result, this trade does not have a significant impact on overall UFT⁴.

The collected primary and secondary data is primarily quantitative, involving empirical statistics. Using experimental research design, the collected quantitative data was then analyzed using a Multinomial Logit regression model (for Determinants) and descriptive statistics techniques to provide comprehensive insights into the patterns, trends, size, and characteristics of UFT⁵.

Earlier, during the pilot survey, semi-structured interviews with key stakeholders across various institutions, Trade Development Authority Pakistan (TDAP), Federal Bureau of Revenue (FBR), Bureaucrats, customs officials, traders, etc., were conducted to get further detailed insights about UFT and the conclusion and policy recommendations of this study. A comprehensive survey and observation of critical routes used for UFT along the Pak-Iran border was also carried out while collecting the UFT data⁶. This analysis not only provides valuable insights into the determinants and impact of the UFT but also sheds light on potential avenues for intervention.

Here, surveys were administered through in-person meetings to ensure clarity and accuracy of responses. Responses were meticulously tabulated and reported, primarily in the form of frequencies or percentages, to provide a comprehensive understanding of undocumented economy perspectives and behaviors related to undocumented fuel trade.

4.3. Methods of Data Collection and Sampling

To directly gauge UFT, the data on UFT's socio-economic footprints and the size of the UFT is unavailable. Tax collection, theft of petroleum levies in undocumented fuel trade, number of undocumented fuel selling outlets, and the supply and demand of petroleum products, the net worth

⁴ According to a pilot survey by the author conducted from November 20 to November 30, 2023.

⁵ Overall, the study does not rely on observation/ethnographic, and qualitative methods due to the potential for researcher bias or subjectivity in data interpretation and collection (Emerald, 2023).

⁶ After the pilot survey, the final survey was conducted from June 20 to July 3, 2024.

of people involved and the penalties in UFT activities can serve as proxies here (Sharif , 2000; Division, 2021). However, every methodology has its own merits and demerits.

In 1985, an individual attempted to export restricted electronic devices to Pakistan which was reported by The New York Times and CIA. Without investigating the actual worth of restricted electronic devices, the case resulted in a plea bargain. This raises concerns about the leniency of penalties in such cases (HNN, 2015). Networth/worth of all the UFT traders can also be used to estimate the overall footprints of UFT. In 2017, reportedly, Seth Abid, a famous gold smuggler, have a reported net worth of \$3 billion (Khan H. , 2021). However, despite multiple efforts Seth Abid was never penalized due to the deficiency of data and proofs. This raise questions on the reliability of such data. Tax documentation and transparent auditing in Pakistan, faces similar issues.

To explore the variations in the supply and demand of oil, a commission was formed by Pakistan's Cabinet Division in 2021. The commission employed multiple methodologies to estimate the size of UFT economy. A number of undocumented fuel outlets for estimating the socioeconomic footprints of UFT was used by the commission. However, this methodology requires extensive resources as the supply chain of UFT spans over thousands of kilometers. In this study, for the quantum of UFT, insights from multiple studies (discussed above) have been taken into consideration. However, the rationale for the selected methodology and details of studies that have used reliable approaches is provided here:

To quantify the undocumented economy (UE) or the impact of UFT on the national economy, Sharif (2020) based on the primary data using field observation of the number of trucks carrying undocumented products as a proxy. The study states that relying on direct field observations of trucks and fuel-carrying vehicles provides more grounded insights. However, Weimar (2008) criticized field observations methodology and termed it as a subjective approach and relied on the amount of fuel carried by cars and the number of cars used for the 'Motor Fuel Tax Evasion' using secondary data of the number of vehicles carrying UE products to quantify UE.

Building on this, Ehsan (2024) notes that methods involving vehicle-based quantification are essential in border areas since traditional economic data collection is impractical due to the nature of such activities. The present study uses data about the number of vehicles and the volume of fuel carried by the cars/vehicles used to quantify the UFT of Pakistan.

Nonetheless, the quantum and value, in essence, can guide researchers in the macro impacts of the undocumented fuel economy in the national economy as a whole—that is, in terms of volume. However, identifying its determinants and understanding how this undocumented economy affects various sectors, sub-sectors, and participants at a micro level remains an area requiring further exploration. For this, primary data is collected from inhabitants of border districts using a questionnaire that contains semi-structured questions (about determinants and footprints) from the selected population that is directly engaged in UFT. Details and rationale of the sampling frame and the sampling method provided hereunder:

4.3.1. Sampling and data

Reliable analysis of UFT depends critically on the quality of the sampling strategy. A well-designed procedure ensures that estimates approximate population parameters and are not distorted by systematic error. When participants selectively disclose, exaggerate, or withhold information, the resulting data are vulnerable to sampling bias. Apparent fluctuations in UFT activity, whether an increase or a decline, may therefore reflect bias rather than genuine changes in underlying behavior. Such distortions undermine both the accuracy of estimates and the validity of inferences, making systematic and carefully designed sampling important for conducting a robust study.

However, collecting unbiased data on UFT is especially challenging due to the sensitive and informal nature of such activities. Lists maintained by official committees, where available, may not fully capture the breadth of participation. Voluntary responses can however disproportionately attract certain groups more willing to disclose information. For example, individuals with higher education or income may be more likely to participate in UFT surveys, even though they do not represent the majority of UFT participants. A pilot survey conducted for the current study also suggested that most individuals involved in UFT belong to low-income groups. If other segments (such as high income groups) dominate the sample, the analysis may suffer from confounding and misrepresentation. Ideally, participants should resemble one another in characteristics relevant to the study, but in practice this is difficult to guarantee, leaving confounding as a persistent risk that must be acknowledged and mitigated.

To avoid these problems, this study employed simple random sampling (SRS). Nevertheless, if a researcher relies on personal judgment to select participants, the study may also unintentionally become biased. There is evidence to show that human judgment often fails to produce representative samples. A better approach is to rely on impersonal chance (Boonsrinugul, 2023).

The laws of probability ensure that, with a sufficiently large number of randomly selected individuals, the sample will resemble the broader population in terms of all significant variables, even those not explicitly identified. This technique is known as SRS, and when used in research, it allows for objective conclusions free from human bias.

However, for the SRS, a clearly defined population is needed. In the present study, the population is the individuals engaged in UFT districts along the Pakistan-Iran border. This eliminates biases that might arise from the inclusion of ineligible participants.

Poorly designed studies often produce conflicting or unreliable results because they lack this rigor. That is why the sampling design used in this study matters deeply. SRS is particularly suitable when the goal is to gather reliable data from a diverse population, and it enhances the credibility and generalizability of the findings (Adams et al., 2007). Given the objective of exploring causal relationships and long-run patterns in UFT behavior and its socioeconomic impacts, SRS emerges as the most appropriate and scientifically grounded method.

For the present study, the target sample size is 240 participants. The above sample size is based on (Varavay, 2015) the sample size formula. Moreover, the ‘sample to variable ratio’ is maintained not less than 5:1. Originally this relationship was made by (Suhr, 2006) using confirmatory factor analysis (CFA) by testing the hypothesis that a relationship among the observed variables exists when the given ratio is followed.

Furthermore, the questionnaire design incorporates cross-check questions and anonymized responses to encourage truthful reporting. The involvement of the local researcher as the sole enumerator, trained in ethical and culturally sensitive approaches, helps establish understanding with respondents, thereby increasing the likelihood of accurate data. Unlike convenience or purposive sampling, which may yield skewed or non-generalizable insights, this study’s reliance on SRS and its structured safeguards ensures credibility as well as reliability to the information collected from UFT participants.

Later on, based on the quantum, determinates, and socioeconomic footprints, the summary statistics are represented. Based on the stated exercise, insights and patterns are derived based on the coefficients, averages, frequencies, and variations of the responses related to UFT.

District-wise data on general socioeconomic indicators, such as poverty, health, education, etc., is available in multiple government surveys. However, data regarding the determinants and impact of UFT on the provincial economy is unavailable. Raheem (2021), employing purposive sampling

and interview guides, explored the motivations and practices of individuals engaged in UE and identified some major determinants of the UE.

Keshavarz (2022), using observational study methods, provided multiple impacts of UE on different economies. Najeeb (2022) used survey questionnaires to collect primary data related to UE. Zafran (2022) identified the initial point in data was by the researcher, and then using snowball sampling, primary data was collected. Varavay (2015) used random sampling to explore the problem of the underground economy.

This study moreover adopts a triangulated approach, integrating multiple forms of evidence to strengthen its conclusions. Estimates of daily fuel volumes are based on the secondary data of UFT committee token/permit records. The employment effects are also derived from secondary data on the oil trade. These insights are complemented by primary survey findings on the determinants of UFT participation and micro-level household responses, which emphasize UFT's role in providing economic security and stability. By combining secondary and primary sources in this way, the analysis minimizes the risk of sampling bias and enhances the validity and credibility of the findings.

4.4. Analysis

Many direct and indirect techniques can be used to estimate the determinants and socioeconomic footprints of the UFT. Mainly, there are three categories for the estimation: direct approaches and indirect approaches. Each approach has its strengths and weaknesses. Details of these approaches provided here:

In research, the Sample Survey and the Tax Audit procedures are considered to be the two main direct approaches to exploring undocumented. The former technique provides accurate information as it covers a sample that is representative of the population vis-a-vis using Tax Audits. Moreover, the latter has some limitations. An audit is a lengthy and comprehensive process. Hence, even a part or sample population of the economy is difficult. Moreover, in audits fraud, bribery, and rent-seeking behaviors are often found. Nonetheless, both approaches need links, time, and cost (Greenidge, 2009).

In survey-based approaches, the unwillingness of the respondents can lead to unreliable results (Asteriou & Hall (2021)). For instance, UFT traders often prefer secrecy due to the risk of legal actions due to the undocumented nature of the oil trade. However, the researcher's linkages within the undocumented economy can be used to find willing individuals who can be selected.

Additionally, unbiasedness can be ensured by employing a random sampling technique. A survey-based approach can save time and cost by using links and conducting simple random sampling from a sampling frame.

Indirect techniques, however, provide macro statistics about an industry but are unable to deliver results for the structure and subsectors of an industry unless an ample amount of data is not available (Greenidge, 2009).

In this study, the direct approach is preferred over the indirect approach. Because in developing countries like Pakistan, it is not possible to find the required sample amount of data for indirect approaches. Additionally, comparing predicted results with the undocumented economy's actual (non-observable) results is difficult. In other words, an "acid test", to analyze whether different indirect approaches to estimating the undocumented economy give exact values or not are unavailable. Such a situation leaves uncertainty on the estimation performances of such approaches (Anno, 2023). This study aims to avoid this obstacle by following the direct method, which, in essence, may give a more accurate depiction of the UFT.

4.4.1. Estimating Quantum of the Undocumented Economy

This segment provides details on the approach used for estimating the quantum of the Undocumented Economy. At the Pak-Iran border, district administration authorities keep records of the drivers, number/type, and engine number of vehicles used for transportation to regulate and avoid any congestion at the borders. In this study, the secondary data for the number of vehicles⁷ which are used for the transportation of undocumented fuels used as a proxy for determining the quantum of the economy and employment levels, using information on the number of pickups (Zamyads: a vehicle locally pronounced as Zambad) per day⁸, the quantity of fuel transported per pickup⁹, and the involvement of drivers, and assistants (fuel loaders)¹⁰. Determinants of UFT:

⁷ Zamyad (locally pronounced as Zambad) pickups are used for the transportation of undocumented fuel trade at the Pak-Iran border because this vehicle is capable of transporting a huge amount of fuel in the hilly areas of Balochistan.

⁸ The oil economy itself is complex. Hence making it difficult to determine the exact annual value of the UFT. International oil prices fluctuate daily, and Pakistan adjusts its prices fortnightly. Meanwhile, a single UFT vehicle typically completes only one trip per month due to the uncertain and unpredictable environment in border regions, including frequent, unanticipated border closures (as observed in the survey). Capturing such a dynamic phenomenon requires extensive field surveys conducted over several months or years to fully grasp the different facets of this economy. That's why this study aims to estimate the per-day volume of the UFT.

⁹ Based on field survey.

¹⁰ Based on the initial survey, this study assumes that throughout the route there is one driver and three assistants are involved in the UFT.

The quantum of the UFT may provide the overall implications it possesses on the economy, such as its share in the fuel consumed in the economy.

Another important question of this study is exploring the UFT determinants that directly motivate individuals towards UFT. In the literature, for the determinants of UFT, multiple linear & non-linear, and also econometric and non-econometric techniques have been employed, following both direct and indirect approaches.

Regression Model

UFT is affected by factors such as prices, income, kinship relations, age, experience etc. To capture them, the present study's preferred model was selected among multiple choices after an extensive review of literature since here exist an ample amount of alternatives models. An overview of the the model and alternative choices and the model's transformation into the logit and multinomial logit model is provided hereunder:

In the literature, descriptive analysis is often utilized to provide insights into the determinants of UFT. However, given the significance of the issue, this study aims to advance further by establishing relationships among variables using a regression model. Therefore, regression models are preferred over descriptive analysis since they cannot achieve the objective at hand.

Within regression models there are number of techniques available, many scholars have used Structural Equation Models or SEMs. SEMs are models used to capture unobserved phenomena like UFT (David, 2014). However, they require a clearly defined measurement model involving multiple variables. Albeit its global contemporary applications, the subjective nature of identifying relationships and SEM's may not be suitable for analyzing the UFT due to its reliance on large sample sizes. The literature on UFT in Pakistan is in its infancy. UFT data often lacks formal documentation, leading to challenges in establishing accurate measurements. Moreover, the complexities and informal nature of UFT may not align with the assumptions underlying SEM, such as linearity and multivariate normality. These limitations make the SEM model less appropriate for exploring the determinants of UFT participation. Due to similar data-related issues, other multivariate time series econometric models such as VAR and ARDL were not considered in this study.

Numerous scholars have used simple linear regression models using OLS. The model establishes the following relationship:

$$UFT_i = \beta_1 + \beta_2 X_{2i} + u_i \quad (1)$$

In studies examining UFT, the dependent variable is often a latent variable that simple regression cannot effectively predict. Instead, researchers typically use alternative methods like probit and logit models. The logit model is particularly suitable for analyzing categorical dependent variables with multiple outcomes. It effectively assesses the factors that influence individuals' decisions in the undocumented economy, including their participation in UFT (Rajper, 2021).

Probit and logit models are often used to identify the determinants of UFT. In such models, the latent variable presents two possible outcomes: either to trade or not to trade or to use good 1 or good 2 (Mengstu, 2023). This results in a dichotomous variable that indicates presence or absence through two categories. Studies with this model rely on a single Logit or Probit equation to estimate the probability of making a specific choice. The model can be mathematically represented with the following equation:

$$UFT_i = \beta_1 + \beta_2 X_{2i} + u_i \quad (2)$$

However, since UFT_i is of a qualitative nature, here the interpretation is different. It is the probability of $UFT_i = 1$ that is, ($UFT_i = \Pr(UFT_i = 1)$); therefore $1 - UFT_i$ is the probability of $UFT_i = 0$; ($1 - UFT_i = \Pr(UFT_i = 0)$). To put it more precisely:

$$E(UFT_i) = 1 \Pr(UFT_i = 1) + 0 \Pr(UFT_i = 0) = 1UFT_i + 0(1 - UFT_i) = UFT_i \quad (3)$$

Equation (3) suggests that the expected value of UFT_i is equal to the probability of the i^{th} individual. For this reason, this model is called the linear probability model. Therefore, the values obtained for the coefficients are capable of estimating the probability/ probabilities that an individual with a given background will choose a specific trip. However, the dependent variable does not always have a probability of 1 and 0. Sometimes, it can also go beyond 0 and 1, negative coefficients that are quite common in econometrics.

An estimation using OLS can cause significant problems. An alternative estimation method that restricts the values of UFT_i to lying between 0 and 1 is mandatory here. Such a model is discussed in the following paras that can resolve the stated problem.

A general Logit model

A simple way to resolve this problem involves the following two steps. First, transform the dependent variable, UFT_i , as follows, introducing the concept of odds:

$$\text{odds}_i = \left(\frac{1}{1 - p_i} \right) \quad (4)$$

Here, $odds_i$ is defined as the ratio of the probability of success to its complement (the probability of failure). The second step involves taking the natural logarithm of the odds ratio, calculating the logit, L_i as:

It is easy to see that this model (which is linear to both the explanatory variable and the parameters) can be extended to more than one explanatory variable, so as to obtain:

$$L_i = \beta_1 + \beta_2 X_{2i} + \beta_3 X_{3i} + \dots + \beta_k X_{ki} + u_i \quad (5)$$

Notice that the logit model resolves the 0,1 boundary condition problem because:

- (a) As the P_i approaches 0 the odds approach 0 and the logit ($\ln 0$) approaches $-\infty$.
- (b) As the P_i approaches 1 the odds approach $+\infty$ and the logit ($\ln 1$) approaches $+\infty$.

This method uses an iterative estimation technique that is particularly useful for equations that are non-linear in the coefficients. In short, UFT_i is now changed to L_i .

The logit model stands out as a suitable choice due to its ability to handle categorical dependent variables (the heterogeneity of choices individuals face) with multiple outcomes (determinants) (as in the case of this study). These models allow for the analysis of factors influencing individuals' choices among different activities within the undocumented economy, such as participation in UFT (Kalina, 2022).

By capturing the complexities of decision-making and incorporating insights from Utility theory and Prospect theory, this model can provide a comprehensive understanding of the factors driving participation in UFT. Hence, for more than 2 categories, as in the case of UFT, multinomial logit models are preferred over general logit and other models as the former can simultaneously analyze more than two categories (Kalina, 2022).

Multinomial Logit model

Bentham (1843) laid the groundwork for utility theory, which assumes that individuals act rationally to maximize their utility. This principle has guided the development of many econometric models, including discrete choice frameworks. In UFT, utility theory explains how individuals assess options based on expected gains, such as higher income or cost savings, and make trade-related decisions accordingly.

However, not all behavior fits into the utilitarian framework. Kahneman and Tversky (1979), in their Prospect theory, offer a complementary lens by emphasizing that people value gains and losses relative to a reference point and tend to be loss-averse. Particularly in UFT, decisions are

made under uncertainty and risk. Traders may continue risky activities not just for profit, but to avoid losses in livelihoods or social standing.

Combining both perspectives, Multinomial Logit models become particularly useful. They allow for the estimation of choices across multiple alternatives, where each decision reflects either a utility-maximizing calculation or a prospect-theory-informed response to perceived risks and losses. Thus, both theories together enrich the understanding of UFT in multiple contexts.

Multinomial logit regression models have multi-equations with a dummy dependent variable with $k - 1$ equations and k categories (depending on the problem at hand). In this case, two equations are used for a k ($k=3$ in this study) categories variable; $k-1$ equations. For instance, UFT participants make different visits per month (a) only one visit, (b) 2 visits, (c) 3 or more than 3 visits. Here the response variable have three levels. The situation can be defined as follows:

$$UFT_i \begin{cases} 1 & \text{for a specific numbe of visits} \\ 0 & \text{otherwise} \end{cases}$$

More simply:

$$UFT_1 \begin{cases} 1 & \text{if only one visits} \\ 0 & \text{otherwise} \end{cases} \quad (6)$$

$$UFT_2 \begin{cases} 1 & \text{if if 2 vistis} \\ 0 & \text{otherwise} \end{cases} \quad (7)$$

$$UFT_3 \begin{cases} 1 & \text{if if 3 or above visits} \\ 0 & \text{otherwise} \end{cases} \quad (8)$$

This study aims to explore a phenomenon that is “why some UF traders decide to choose three trips over two or one”. This variable is a polychotomous (it take the value of 1,2, or 3). For example, in the questionnaire of this study multiple individuals answers to questionnaire on type of trade were 1 trip, two trips and 3 trips. The survey suggests that the decision to go out for 1 trip or multiple is a function of the kinship relations, age, level of education, family income and so on; it is not affected by only one explanatory variable family or price; Traders have three type of trade frequencies; 1, 2 and 3 or above, among which they make one selection. Consequently, traders’ choice follows multinomial data distribution. The underlying assumption in this model is that, a trader selects frequency to a latent utility function (UFT_i) where a chosen alternative among prevailing options has the highest satisfaction for the trader (measured in the number of visits to the border). However, in the above dummy regression, only two of the three dummies are needed and one is dropped, because it is reserved as a benchmark category (normally the first, the last, or

the value with the most frequent outcome of the DV). Therefore, the following empirical model of UFT with two equations (k-1) will be used in the multinomial regression model:

$$UFT_1 = a_1 + a_2X_{2i} + a_3X_{3i} + \dots + a_kX_{ki} + ui \quad (9)$$

$$UFT_2 = \beta_1 + \beta_2X_{2i} + \beta_3X_{3i} + \dots + \beta_kX_{ki} + vi \quad (10)$$

which can be estimated by either the logit or the probit method, based on the distribution of the disturbances (*ui or vi*) of the data.

Where UFT_1 and UFT_2 is the utility that a trader obtain from choosing a specific trade frequency; the number of visits to the border (0, 1,2,3...).

In the model $[X_i]$ refers to the determinants while $[a_2 \text{ and } \beta_2]$ refers to their respective coefficients. The individual selects UFT_i that maximises the utility or the satisfaction that a the fuel trader obtain from the number of visits. The results of the two equations can be interpreted as the probabilities of using the number of visits described by each equation. This method eliminates any underlying bias in the case of simple OLS due to the unobserved explanatory variables that are used as latent variables in the multinomial model. Moreover, the properties of the large sample size, the maximum likelihood estimation method are employed to yield consistent coefficient estimates respectively. For examining the model significance, a global null hypothesis was used in equation (11). For this study, a null hypothesis is developed assuming that all the coefficients are equal to zero of the model (indicating that the determinants have no significant impact on participation in UFT versus that one coefficient is not zero (suggesting that the determinants significantly influence participation in UFT), precisely:

$$\begin{aligned} H_0: & \text{ All coefficients are equal to zero.} \\ H_1: & \text{ At least one coefficient is not equal to zero.} \end{aligned} \quad (11)$$

This method is like the F test in the simple regression model¹¹. For the significance/goodness of the model pseudo R^2 and p-value criteria is followed.

4.4.2. Socioeconomic Footprints

In Pakistan, for the socioeconomic footprints of the undocumented economy, scholars have also employed descriptive analysis to give summarized details of the socioeconomic footprints of the undocumented economy on the local economy. Regression models like discrete choice or other

¹¹ Simple linear regression model assumes linear relationship between two variables and estimates coefficients of a regression model by minimizing its sum of residuals (Asteriou & Hall, 2021). In both models, if the p-value (alpha) is less than 0.05, the F test rejects the null hypothesis.

cross-sectional models (discussed in the previous section) are also employed in the literature to explore the theory of international trade and its impact on an economy or a geographical region. However, the aim this In this study this method was employed to get socioeconomic footprints as the objectives are the same; contemporary impacts rather than establishing relationships among variables.

4.4.3. Supply Chain of Undocumented Fuel Trade

Determinants and socioeconomic footprints can inform the researcher about the magnitude and causes of the UFT. However, how the UFT transcends into the formal economy remains an area to explore. For this, UFT supply chain analysis (SCA) has been performed. SCA refers to analyzing the agents that provide a final or finished product. This approach is widely used in studies of contraband, illicit, and illegal goods and undocumented economy (Jernigan, 2000).

In this study, SCA-data was collected through FGDs with people who buy, sell, or transport undocumented fuel throughout the supply chain. The “key informants” are regular customers, business associates, drivers, etc. The researchers traced the path of the UFT forewords, starting with the consumers selling in the locale or retailers and working their way to the main market, and conducted interviews throughout this supply chain.

Nevertheless, in the rest of the world, there are challenges in the SCA of the undocumented economy in interviewing participants about the UFT. However, in the locale of this study, participants see UFT as a normal activity and consider it the basic element of the transportation sectors; UFT is not widely stigmatized and sold openly. Hence, direct discussions of people involved in the UFT were less problematic for this study. In essence, for the SCA, FGDs were conducted from drivers while traveling the supply chain with the drivers in the UFT vehicles (Zamyads). Their responses provide valuable information about the intricacies of the supply chain.

Selection Criteria of a Driver:

Drivers are assessed on a range of characteristics. The name of a driver is chosen from the list of drivers provided by the UFT committees. Later, the reputation of the driver among the individuals living in the border districts was identified. The focus is on getting great detail about UFT.

Importance of Supply Chain, Socioeconomic Footprints and Determinants of UFT

Understanding the UFT supply chain is crucial for identifying trade routes, actors, and the flow of fuel, which can inform about UFT working. A detailed supply chain mapping reveals logistical challenges and opportunities, aiding in developing targeted measures to monitor and control

activities. The socioeconomic impact insight enables researchers to evaluate the benefits and drawbacks of UFT and add to the literature of community-specific development programs. Identifying the factors driving UFT (e.g. economic incentives, lack of alternative livelihoods, and regulatory inefficiencies) is essential for crafting targeted interventions to address the root causes of this trade.

The analysis were performed using R Studio software. Challenges in data collection included Balochistan's rough terrain, border closures, and respondent illiteracy. Despite these obstacles, 244 responses were gathered (employing all the available/possible resources), supplemented by insights from FGDs conducted while traveling along the supply chain. The study also provides a geographical overview and examines the political economy of UFT for a comprehensive understanding¹².

Before providing the results, based on the literature, this following segment shows how UFT emerged. Exploring the emergence of undocumented fuel economies is important since it lays the conceptual and contextual foundation for understanding how and why UFT arises and evolves in specific regions.

Ethical Considerations

Given the sensitivity of UFT activities, ethical safeguards were an integral part of the study design. Participation in the survey was entirely voluntary, and informed consent was obtained verbally before each interview. Respondents were assured that their identities would remain anonymous and that no personally identifying information would be recorded. To further minimize risks, all responses were coded and aggregated, preventing any link between individual participants and specific disclosures.¹³

¹² The author is much indebted to the UFT drivers. Without them, the study and the survey were impossible.

¹³ The study also recognized the possibility of retaliation or social stigma if respondents were identified as UFT participants. To mitigate this, interviews were conducted privately by the researcher himself (a local of Balochistan), who tried to ensure ethical and culturally appropriate communication. Respondents were reminded that they could withdraw at any time or decline to answer any question without consequence.

While no "acid test" can fully eliminate the risk of bias or ethical compromise in sensitive fieldwork, the direct presence of the researcher as sole enumerator reinforced integrity, ensured consistency in engagement, and fostered a climate of trust with participants. These safeguards somewhat protected respondents and enhanced the credibility and trustworthiness of the data collected. Indeed, conducting UFT research is not comparable to a controlled lab experiment. Some degree of bias may inevitably emerge, the safeguards applied here (anonymity, voluntary participation, and the researcher's direct presence) help to uphold integrity and minimize these risks.

5. Undocumented Fuel Trade

To fully grasp the implications of UFT, it is essential first to examine how UFT occurs, the supply chain of UFT—that is, the regions through which this trade flows, how it has evolved and how its business models works. This Chapter provides a detailed overview of UFT. Section 5.1 provides an overview that is how UFT evolved and emerged over the years.

5.1. Emergence of Undocumented Fuel Trading Economies

Ever since the Iranian Revolution, a profound transformation has been set in motion within the global economic paradigm. This political disorder has not only altered the course of history but brought forth a variety of socioeconomic footprints on the economies tied to Iran and its fuel supply (Katz, 2023). What began as a political conflict between Iran and the U.S. soon escalated into an economic standoff, leading to sanctions that profoundly reshaped regional fuel trade patterns. These sanctions, aimed primarily at curbing Iran’s financial prowess, restricted its formal trade opportunities. In response, undocumented trade in general, and the UFT in particular, surged in prominence in the economies tied to the Iranian oil. This surge has led to persistent UFT into neighboring countries reliant on Iranian oil. This reliance was driven by the high demand for cheaper fuel. (see Figure 1).

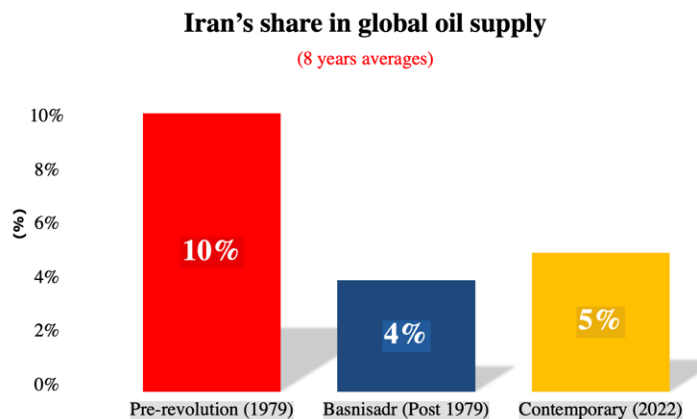


Figure 2: Iran’s Share in Global Oil supply

Source: Iranwire (2023)

In 1979, Iran was the second largest supplier of global oil. However, after the sanctions, its share dropped to a meager 4% in 1980. Currently, on average, the share of Iran in the global oil supply is limited to 5%. Likewise, Iran, which ranked 19th globally in terms of GDP in 1979, has since moved to 34th place (as of 2022). This shift resulted in multiple socioeconomic challenges, including inflation and unemployment, contributing to a notable decline in the value of its currency and oil prices (Mozayani, 2021).

Since 1979, annually, approximately 7.75 billion liters of undocumented oil have entered the neighboring countries of Iran. UFT is still comparatively a lucrative business in these nations because of the discrepancies in fuel prices due to high tax rates. Up to 70 percent of this price goes to state taxes. The extremely expensive fuel due to such taxes forces consumers to rely on the UFT. Likewise, similar circumstances also contributed to the emergence of an undocumented economy in Pakistan, a developing country heavily reliant on oil (Katz, 2023). Pakistan, the eastern neighbor of Iran, stands at a crucial juncture, facing multiple socioeconomic challenges due to its dependence on expensive fuel sources (Shah, 2024). High inflation and unemployment are also major concerns in Pakistan. The country depends significantly on oil, with MS and HSD accounting for over 80% in its fuel mix (in FY 2023 the share was 83%) (OCAC, 2023). Additionally, with a 241.49 million population and a 0.03% annual population growth rate, the trend in Pakistan's energy imports is also increasing. From 2000 to 2021, a significant increase of 144% has been observed in its energy imports (IEA, 2023; PBS, 2023).

Oil is an expensive energy source, and importing petroleum products is a huge burden on the fragile economy of Pakistan due to the recurring dollar shortages that the economy is facing (Ehsan, 2023). Moreover, these products serve as a basic commodity in Pakistan. However, this commodity is used as a revenue source by the GOP to cover the amount required for 80% of imported oil payments and balance its budgetary revenues and expenditures. The total tax on petrol ranges from 35% to 45% of its original price, which not only increases the prices of the commodity itself but the overall price levels of the country (Rehman & Durrani, 2021).

UFT is not specific to Pakistan. The lack of formal employment opportunities in the border regions of multiple developing countries such as Pakistan, Iraq, Afghanistan, and Turkey lead to significant UFT (Katz, 2023). The ripple effect of U.S. sanctions created undocumented economic discrepancies in the global fuel supply and prices compared to pre-revolution levels. Since then, a significant Iranian UFT network has been diverting between 500,000 to 750,000 metric tons of subsidized heavy fuel oil monthly (equivalent to 3.4 to 5 million barrels) for undocumented export, primarily to Asia. They exploit government allocations intended for asphalt plants. They generate annual revenues ranging from \$1 billion to over \$3 billion, circumventing the international oil sanctions. In January 2025 alone, Iraqi authorities arrested over 150 individuals and seized 116 illegal fuel tankers, carrying approximately 2.66 million liters of petroleum products (Shafaq, 2023).

In summary, globally, an interplay of geopolitical tensions, economic sanctions, and regional socioeconomic pressures has fueled the rise of UFT in neighboring countries of Iran. The UFT imposes significant financial and social burdens on fragile economies like Pakistan, which struggle to balance economic stability with the high costs of energy dependence.

5.2. Locale and Geography of UFT

This segment provides an overview of Balochistan’s border areas (Chaghi, Washuk, Panjgur, and Kech) from where the undocumented fuel enters Pakistan. It shows that how spatial patterns, physical routes, and socio-political environments shapes UFT.

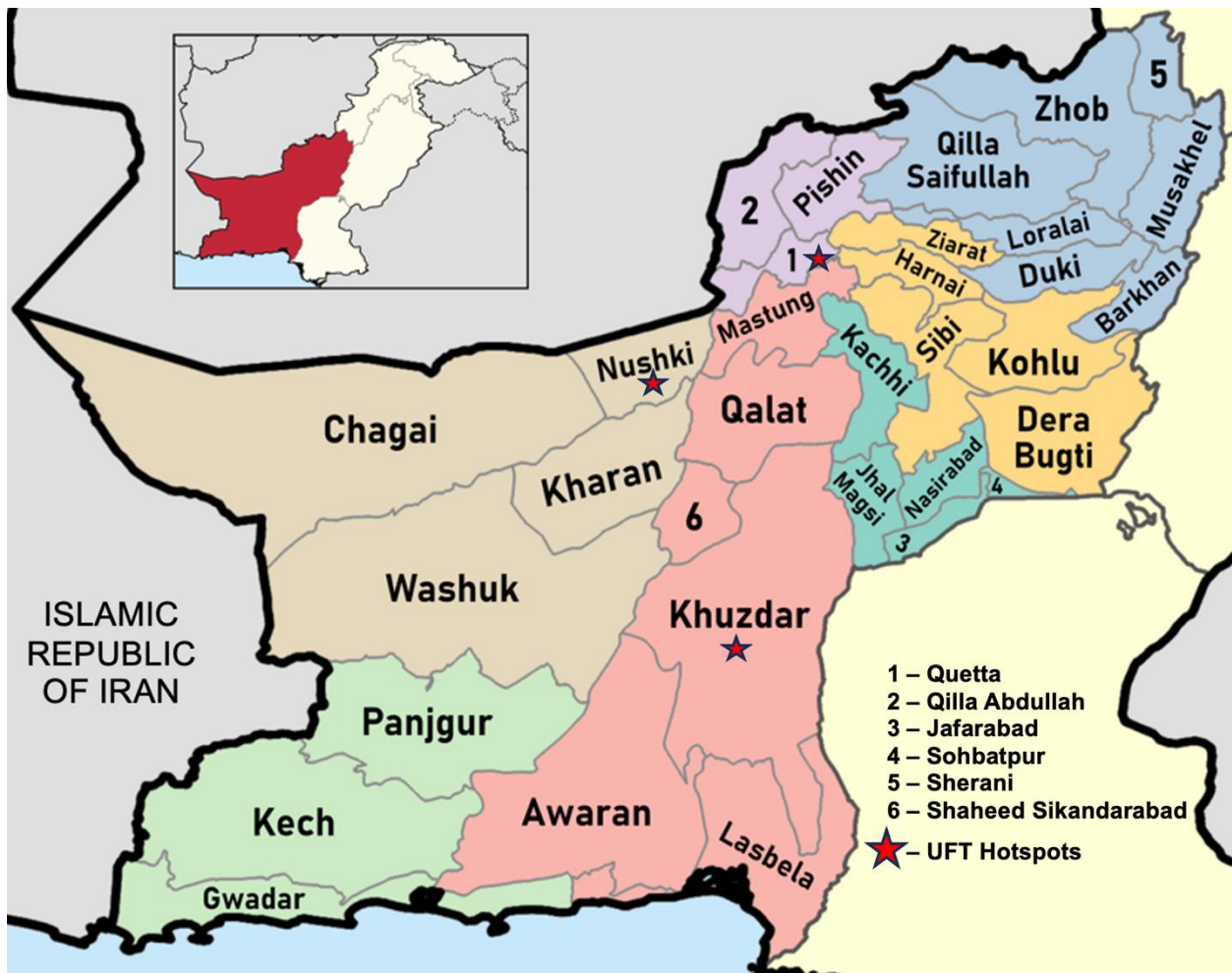


Figure 3: Map of Balochistan

Source: Author’s depiction based on (Survey of Pakistan, 2024)

Balochistan, the westernmost province of Pakistan, is characterized by its diverse and resource-rich landscapes. The province shares a 909 km border with Iran (CGOP, 2024). The focus of this study is on the border regions of Balochistan, specifically Chaghi, Washuk, Panjgur, and Kech,

through which undocumented fuel enters Pakistan. In the subsequent sections, UFT insights are provided about the bordering districts of Pakistan.

5.3. Pak-Iran Bordering Districts

The Pak-Iran land border includes the following four key border districts:

Chaghi

By area, Chaghi is the largest province of Balochistan (see Figure 3). It is the north-western border district with border crossing points at Taftan, Zero Point, and Rajay-Rutak borders. Only, the Rajay-Rutak border is used for the UFT. So, the former two borders are excluded from this study. Its sub-districts, Nokundi and Dalbandin use the Rajay border point for UFT.

Washuk

Washuk is the second Pak-Iran border district (from north-western side) with border crossing points at Guzzar and Bacharahi borders (the latter being used for undocumented trade).

Panjgur

Panjgur is the third Pak-Iran bordering district with Chadagi and Jirak border crossing points.

Kech

Kech is the third Pak-Iran bordering district having borders at Abdu, Radig-Mand, Jalaggi, and Dasht. Geographical depiction of the border districts and the UFT hotspot (most trading buying/selling points) are provided in Figure 3.

5.4. The Political Economy of Undocumented Fuel Trade (UFT)

The Zamyad vehicles, capable of carrying up to 6000 liters per trip, are considered to be the main pillar of this trade and essential for transporting undocumented fuel. Government authorities issue “permits” to these vehicle. These permits or tokens allow the vehicle at various border points to cross the border and load the fuel then re-enter Pakistan. According to the survey, the vehicles are documented, the amount of fuel traded remains undocumented. Additionally, a completely informal trade occurs at the Bacha Rahi border (the excluded border point in this study), primarily in the Washuk District. A negligible amount of trade occurs at Bacha Rahi border. However, this trade occurs without any record of the vehicle and fuel. The allocation of Zamyad vehicle permits varies by district. Chaghi gets 250 permits [250 each for Nokkundi (a sub-division) and Dalbandin (also a sub-division), alternating weekly]. Washuk acquires 400 permits for the its Ghazar border. However, Panjgur acquires 600 permits (250 for Chadagi and 350 for Jirak). The Kech district gets 600 permits. The Deputy Commissioner’s office provides a list of permit holders, including details

like CNIC number, vehicle information, and driver name, to the drivers and border management corps one day before the border crossing. UFT occurs based on this list.

5.5. Supply Chain of UFT

To get the supply chain details, FGDs were conducted while traveling with the UFT drivers. Details about the UFT supply chain and its political economy are based on the FGDs. A detailed overview of the supply chain is provided here.

The supply chain of UFT begins at the neutral border points (between the Pakistan and Iran border from the fuel is loaded). The central border districts like Panjgur primarily send their fuel supply to the cities of Panjgur, Turbat, and Khuzdar via Zamyad vehicles. Meanwhile the northern districts (Chaghi and Washuk supply to Noshki). From Noshki, the fuel reaches the provincial capital, Quetta.

From Quetta, the undocumented fuel is transported to various provincial capitals and the federal capital Islamabad via D I Khan (Dera Ismail Khan).

Towards Sindh (Karachi), using the Khuzdar route, the fuel passes through Lasbela and Hub (see Figure 3).

Lahore: Fuel travels via, Loralai and Zhob city (District Zhob) and D.I. Khan city (Dera Ismail Khan district). In Khyber Pakhtunkhwa (KP) while moving towards the provincial capital Peshawar, the fuel follows Tank City (KP), and Lakki Marwat (KP) routes then reaches the provincial capital of KP.

The maximum transport range of Zamyad vehicles is up to the provincial capital, Quetta. From there, different vehicles like Premio, Corolla (2D), passenger buses, and oil tankers distribute fuel to various city fuel stations across the country. At some security checkpoints where security is strong, even local transport vehicles like motorbikes and Rikshaws are used (sometimes individuals carry a small amount of fuel on their back).

However, according to the respondents, the UFT grapples with multiple challenges within this supply chain. As shown in the Map, the distance between the main UFT hotspots and the border is 5 hours long. The terrain is hilly and there are muddy roads. Every day, human life losses occurs because of regular fires (Zambad vehicles often capture fire due to high temperatures and lack of safety measures) and strict regulations to the rough and tough mountainous conditions of the region. As a result of such circumstances, individuals in Balochistan and Iran face/encounters difficulties

that are making the life of the individual difficult in the absence of alternative employment opportunities. As one of the drivers said:

“During the pandemic (COVID), for months, the border was closed, and there was no food for my children. Sadly, not enough effort was made by the government to support the border people. I can spend a week without any food. However, my children... they cannot”.

5.6. Price Dynamics Along the Supply Chain of Undocumented Fuel Trade (UFT)

Price is also one of the significant determinants of UFT. The following discussion provides a detailed account of how the price evolves as the fuel moves through different locations within Pakistan. In the Sistan-Balochistan region of Iran, the fuel is initially priced at PKR 90 per liter due to its surplus supply. This low price forms the base for the UFT. However, at the Pak-Iran border, where demand is high, the Price is around PKR 110 per liter (on the day of the survey).

Upon crossing the border into Pakistan, Chaghi is the first district, where the price rises to PKR 150/liter. This increase accounts for the costs associated with UFT activities. This includes informal & formal taxes (such as the Zamyad entry license fee).

Noshki: Noshki city is located towards the provincial capital and is approximately 3 to 4 hours away from Chaghi. In Noshki, the price of fuel rises to PKR 160 or 165 per liter. Noshki serves as a significant distribution hub. This increase is attributed to logistical expenses and risk premiums associated with transporting fuel further into Pakistan. Other cities in the region are similarly distanced, typically requiring a 3 to 5-hour drive.

By the time the fuel reaches Quetta, the price ranges between PKR 170 and 180 per liter. Quetta serves as the major distribution hub, and the price reflects the cumulative costs incurred up to that point. Additionally, fuel from all five bordering districts of Balochistan is brought to Quetta, where both demand and supply are high. As a result, fuel prices in Quetta are somewhat competitive (sometimes low or near to Noshki).

Zhob is the border district between Balochistan and KP province. As the fuel progresses to Zhob, the price increases to PKR 200-210 per liter. After crossing Balochistan, the fuel reaches Daraban (a city in KP province), the price reaches PKR 215 per liter.

Rest of Pakistan

The fuel arrives in Dera Ismail Khan (D.I. Khan), a major city in Khyber Pakhtunkhwa (KP), a few hours from Mianwali, Peshawar, and Sargodha. Here, it mixes with documented fuel, causing minor price adjustments, with prices stabilizing around PKR 220-230 per liter as it is distributed

to major cities like Lahore and Islamabad. The Karachi route follows the same pattern while following the Khuzdar and Lasbela route. Occasionally, when supply is high, prices in Lahore and Karachi can match those in Quetta or Zhob. Suppliers can earn PKR 4 or 5 per liter, potentially making PKR 100,000 to 200,000 from delivering a tanker from Noshki to Islamabad or Rawalpindi, with sellers earning similarly based on quantity sold.

5.7. Business Model of UFT

Nonetheless, this significant amount of UFT and its supply all over the country raises questions related to the operation of UFT “how this significant amount of UFT operates in the country”. This section provides details about the business model of the UFT. The UFT model is characterized by a system of informal credit and investment, which allows traders to operate with minimal initial capital. Based on the FDGs with the drivers, the following is a detailed look of how UDT UFT and its business model works.

Initial Investment: To start trading in the UFT, a trader typically needs an initial capital of PKR 100,000, plus a small fuel pump (nozal). This investment is used to purchase the first batch of fuel from the supplier.

Fuel on Credit: Once the initial investment is made, traders can procure fuel on credit. This system ensures that even those with limited capital can continue to operate in the trade.

Revenue and Repayment: After selling the fuel, traders repay the supplier from the proceeds of their sales. The revenue generated from each sale is reinvested into purchasing more fuel, thereby sustaining the trade cycle. The profit margins vary depending on the location within the supply chain. For instance, traders in Quetta may enjoy lower margins compared to those in more distant locations like Zhob or Daraban due to the varying price points along the supply chain.

Risk Management: The business model includes risk premiums against potential losses due to accidents/fires, theft etc. These premiums are part of the pricing strategy at each stage of the supply chain. The overall risk is mitigated by the line system (relations with the people situating along the supply chain).

Operational Dynamics: Continuous cash flow is critical in the UFT business model. A single border closure disturbs this whole cycle. Traders often reinvest their earnings to maintain a steady supply of fuel, ensuring that they can meet the demand and maximize their revenue potential.

6. Results, Discussions, and Findings

This study has two major objectives: a) to identify factors behind UFT due to which people choose UFT over other professions. (b) to explore the socioeconomic footprints of the undocumented economy and the possible role of these socioeconomic factors in the different parts of the undocumented fuel economy. Particularly in the ordinary life of people who are attached to it and in the whole economy in general. This chapter finally achieves these objectives. It starts with providing UFT's detailed macro-level socioeconomic footprints.

6.1. Socioeconomic footprints

Impact on the overall provincial and national economy

The following tables highlight how UFT impacts border communities and the provincial & national economy in terms of fuel supply, employment, income levels, living standards etc.

<i>Districts</i>	(a)Borders	(b)Zamyads	(c) Sul/Zamyad	(d)Oil/Sul	(e) Oil/Zamyad (c × d)	(f) oil/day (e × b)
<i>Chaghi</i>	Rajay-Rutaq	200	85	70	5950	1190000
<i>Washuk</i>	Ghazar	500	85	70	5950	2975000
<i>Panjgur</i>	Chadagi	200	85	70	5950	1190000
<i>Kech</i>	Jirak	380	85	70	5950	2261000
	Abdu	620	85	70	5950	3689000
Total		1900	425	350	30000	11305000

Source: Author's calculations based on the UFT Data

The above Table 1 provides details about the borders used for the UFT from Iran, the number of Zamyads used for the transportation, number of gallons (Sul) loaded on a specific border point in a single vehicle as well as the total liters filled in a single gallon. Finally, it sums the total liters per Zamyad and the UFT (oil per day imported). Based on the above number, the overall fuel imports from Iran are provided in Table 1.

200 Zamyads vehicles cross daily at the Rajay-Rutak border in the Chaghi District. On average, each Zamyad carries 85 gallons of product, with each gallon containing 70 liters. To calculate the total liters transported per Zamyad, the amount of product loaded in each Zamyad is multiplied by

¹⁴ Table 1 depicts the actual Zamyads vehicles crossing at a specific border point. Initially, the survey indicated relatively stable vehicle crossings across the border regions. However, the latest survey shows notable variations, with Washuk recording around 500 (from 400) vehicle crossings. In Chaghi the number has decreased to about 200 (from 250). The names of the borders vary in official records and in local pronunciation across the border region.

the number of liters in a single gallon. Finally, by multiplying the total number of Zamyads by the total gallons (or ‘sul’) carried per Zamyad, the total liters imported at the Rajay-Rutak border each day is estimated at each border.

<i>Districts</i>	<i>Borders</i>	<i>Entry</i>	<i>Total Employment</i>	<i>Dependents</i>
<i>Chagai</i>	Rajay-Rutaq	200	1200	8750
<i>Panjgur</i>	Chadagi	500	7500	8750
	Jirak	200	10500	12250
<i>Kech</i>	Abdu	380	18000	21000
<i>Washuk</i>	Ghazar	620	12000	14000
<i>Total</i>			11400	79800

Source: Author's calculations based on the UFT Data

Table 2 shows the employment statistics related to UFT in the border regions across the four districts. The table categorically provides data related to entry (number of Zamyads allowed to enter the border market), drivers, and the staff (used for loading, driving, helper, etc.) with the total oil-based employment summing these categories. For instance, in the Chagai District at the Rajay-Rutaq border, 200 Zamyads cross the border on an operational day. 1200 UFT individuals, and 8750 dependents (those who depend directly on the UFT traders) daily get income from UFT. Overall, 11400 drivers and 79800 members of their family depend directly on UFT.

Discussion

The data presented in the above tables shows the significant economic impact of the UFT on both provincial and national level. Table 1 provides details about the daily imports of undocumented fuel, totaling 11.3 million liters. This large volume highlights the extensive scale of UFT and its role in meeting the fuel needs within these border regions as well as in the national economy. The district-wise breakdown shows how different borders contribute variably, with Kech district has the largest share in volume. This underscores the critical role these borders play in sustaining local economies. Table 2 further illustrates the direct employment dependence on UFT. The employment statistics show that 79800 individuals and their family members of the UFT help the UFT participants benefiting from UFT. This highlights UFT’s significance in these regions. For instance, in Chaghi district, the Rajay-Rutaq border alone supports 1,200 individuals and there are 8750 UFT dependents.

Theoretical and empirical literature also suggests that bilateral trade has socioeconomic impact on an economy. Internationally, UFT influences the demand for petroleum products. UFT likewise

play significant role in Iran and Pakistan. On average, annually, above one billion liters of undocumented petroleum products are being secretly traded from Iran to Pakistan, Iraq, Turkey, and Afghanistan using tankers, pickups (Zamyads), buses etc. In 2000, in Pakistan, the total value of the whole undocumented fuel economy was PKR 9617.5 million per year (PKR 800 Mn per month) (Sharif et al., 2000). However, in 2022, the monthly trading volume of petroleum products, in a single city (the provincial capital, Quetta), was PKR 72.7, with petrol being one of the most profitable commodity (Zafran, 2022). Additionally, more than 21 major undocumented products were selling in markets operating in the Quetta city.

However, the exact size UFT is not estimated by any study or researcher. In this field, recently, a worthy commission formed by the Cabinet Division. According to the commission's report, 753 retail outlets were involved in UFT-related activities. The highest count of UFT was observed in Quetta (Balochistan). Some of these outlets had MS purchases as high as 600,000 liters per month. The comments and observations of the Cabinet Division regarding UFT are highlighted hereunder:

“It is almost an open secret that petroleum products (especially MS and HSD) are being smuggled into Pakistan from western border of Taftan/Iran. However, the Commission could not proceed on hearsay... The unbridled retail outlets have not been fed with petroleum products from OMCs. Consequently, their only reliance for getting petroleum products is through smuggling.”

Cabinet Division (2021)

Findings

The results states that, from the four districts, above 11 million liters per day oil is coming from Iran to Pakistan. This means that the overall share of UFT in the economy or the national oil or fuel supply is ~25%. However, the share of Balochistan in the national fuel consumption is ~3% (OCAC, 2025). This shows that UFT impacts an economy as a whole. That is this oil is supplied to the rest of Pakistan as well. International trade theory also says that trade impacts an economy (or economies) as a whole. That is, it impacts Balochistan and the national economy as well. Hence, a national UFT policy is needed that address the supply side that is coming from Iran and the demand side that is coming from other provinces of the Pakistan.

These results reiterate the findings of Muhammad et al, (2022) and Cabinet Division (2020) that undocumented trade is a reality in Pakistan. Moreover, this aligns with the National Labor Force Survey (2021) (above 80% of the labor force in Pakistan is informal). This suggests that the daily import of around 12 million liters of fuel underlines UFT's role in fulfilling local energy demands.

Additionally, the employment figures show that UFT is a major livelihood source, supporting many individuals. This widespread economic dependence suggests that UFT is deeply integrated into the socioeconomic fabric of these border regions as well as the countries attached to these borders. Due to such a significant impact of UFT, scholars such as Najeeb (2022) and Muhammad (2022) argue that the border cannot be closed instantaneously without providing alternative employment opportunities. In essence, these results confirm that bilateral trade impacts an economy significantly.

6.2. Regional and Global UFT

The scope of this study is geographically confined to Balochistan, particularly the Pakistan-Iran borderlands. However, Cross-border UFT is neither unique to Balochistan nor to Pakistan. Similar informal economies exist across South Asia, the Middle East, and Africa, where porous borders, large price differentials, and weak enforcement regimes create conditions conducive to UFT (Khan & Mahmood, 2028). Situating the Balochistan case within these wider patterns strengthens the analytical depth of this study and highlights the structural drivers of UFT globally.

In the regional context, the Pakistan-Afghanistan border has long been characterized by informal trade (Zafran, 2022). Unlike the Pakistan-Iran fuel economy, which is primarily petroleum-based, the Pakistan-Afghanistan border economy encompasses food commodities, textiles, electronics, betel nuts etc. (Mahmood, 2018; Zafran 2020). Tribal linkages and cross-border kinship networks also facilitate this trade. These dynamics suggest that while the commodity mix differs, the underlying logic of UFT, providing livelihoods in marginalized areas and exploiting regulatory asymmetries, is broadly similar across Pakistan's borders.

A comparable situation also exists in the Middle East. Along the Turkey-Iraq and Turkey-Iran borders, extensive networks of UFT have persisted for decades. Studies document that small-scale carriers, often using pickup trucks or even donkeys, transport subsidized Iranian or Iraqi fuel into Turkey, where higher domestic prices make the trade lucrative (Erdal, 2016). Despite periodic state crackdowns, the practice continues because it provides income to households in border villages that are otherwise excluded from mainstream economic opportunities. These parallels underscore a central point that UFT thrives where formal markets are weakly integrated with peripheral economies.

Globally, West Africa provides one of the strongest analogues to the Balochistan case. Smuggling of petroleum products across the Nigeria-Benin border has created an informal fuel market that

sustains local livelihoods as well as simultaneously undermines state revenues and energy-sector reforms. Adeleke (2019) shows that Nigerian subsidies on petrol make smuggling profitable, with traders and even ordinary households involved in transporting and selling contraband fuel. Akinyemi (2021) similarly emphasizes the political economy of fuel smuggling, noting that entrenched networks of smugglers, local officials, and security actors perpetuate the system. As in Balochistan, UFT in West Africa represents a survival strategy for the poor but also entrenches informality as a structural feature of the economy.

Latin America also illustrates the persistence of UFT under conditions of economic imbalance. In Venezuela, where domestic fuel prices remain heavily subsidized, large volumes of petrol are smuggled into Colombia and Brazil. UFT reflects economic disparities as well as reinforces local dependency on informal markets. Sanchez (2020) argues that such cross-border flows are embedded in community structures, where families depend on smuggling for their livelihoods.

Taken together, these regional and global comparisons highlight two important points regarding generalizability. First, while the commodities, magnitudes, and specific institutional contexts may differ, the structural drivers of UFT as well as UFT patterns are consistent. Poverty in border regions, price differentials between neighboring countries, weak enforcement capacity, and strong local demand. Second, UFT serves both as a livelihood strategy for marginalized populations and as an enduring challenge for states seeking to regulate trade and secure revenues. Thus, while the findings of this study are geographically grounded in Balochistan, they resonate with wider empirical evidence from South Asia, the Middle East, Africa, and Latin America. This comparative perspective strengthens the robustness of the study and situates its conclusions within a broader global discourse on informal cross-border trade.

6.3. UFT Determinants

An important area that remains to explore is what attracts individuals towards UFT. There exist two theoretical explanations to this question. One is provided by the RCT. The other is provided by the Prospect theory. Based on the conceptual framework, the following factors were analyzed using the multinomial logit model to explore both RCT and PT related UFT determinants. The data related to such determinants was collected during the UFT survey. In the analysis, the sample size is equal for all the variables: 240. The data was collected using the study's questionnaire. However, a pilot survey was carried out in November 2023 to check whether the questions given in the questionnaire are related/linked or not in the context of UFT. Details of the variable as well.

Table 3: Variable Description

Variables	Description	Sources
trips	Number of trips of UFT per month.	(Sharif, 2000)
kinship	Influence of kinship relations on the selection of UFT trips (Likert scale).	(Raheem, 2021)
age	Age of the UFT trader in years.	(Zafran, 2022)
zamyad	Number of zamyads (vehicles used for fuel smuggling) owned by the trader.	(Sharif, 2000)
jobs	Types of jobs performed in UFT.	(Ehsan, 2024)
income	Monthly income from UFT in PKR.	(Younus, 2024)
accidents	Number of accidents experienced in UFT activities.	(Karjanen, 2012)
roleinfamily	Role of the trader in the family (Likert scale).	(Mengstu, 2023)
marit	Marital status of the trader (Single, Married, etc.).	(Ahmad, 2021)
hhsiz	Household size of the trader's family.	(Mengstu, 2023)
housetype	Type of house where the trader resides (Mix, Mud, etc.).	(Rajper, 2020)
urband	Influence of urban demand for fuel on UFT participation (Likert scale).	(Muhammad, 2022)
highwagepros	Influence of higher wages in UFT on the trader's decision (Likert scale).	(Shaterabadi, 2022)
extrafee	Impact of extra fees imposed by authorities on UFT participation (Likert scale).	(Najeeb, 2021)
lackmarkets	Impact of lack of formal markets on UFT participation (Likert scale).	(Varavay, 2015)
lackcorrid	Impact of lack of corridors or infrastructure on UFT participation (Likert scale).	(Muhammad, 2022)
lackjob	Impact of lack of government jobs on UFT participation (Likert scale).	(Younus, 2024)
savefromchaos	Agreement level on "borders save from chaos, insurgency, etc. or not (Likert scale).	(Najeeb, 2021)
docu	Impact of undocumentedness/docu of trade on UFT participation (Likert scale).	(Muhammad, 2022)
marginali	Impact of marginalization and grievances on UFT participation (Likert scale).	(Karjanen, 2012)
line	Characteristics of the settled line of oil smuggling impacting UFT activities.	(Raheem, 2021)
hcapital	Influence of underdeveloped human capital on UFT participation (Likert scale).	(Meymand, 2024)
economy	Influence towards UFT as it keeps the economy stable (Likert scale).	(Ehsan, 2024)
distance	Distance from the border in kilometers.	(Muhammad, 2022)
illicit	Participation in UFT due to its facilitation of illicit activities (Likert scale).	(Younus, 2024)
exp	Years of experience in UFT activities.	(Ehsan, 2024)
edu	Years of education completed by the trader.	(Younus, 2024)
<i>Source: Based on the UFT survey</i>		

as the source (studies based on which the determinants are selected) are provided in Table 3. As stated in Chapter 3 and 4, the variables are categorized according to their descriptions and types. In the trips variable (the dependent variable), 1 trip per month is performed by those individuals who are the owners of Zamyads. Means that they cannot perform the second trip since a single token is given to them by the authorities. 2 trips are carried out by drivers who generally perform two trips using multiple Zamyad vehicles since they work under multiple owners. 3 or more trips are performed by traders who have more than one Zamyad and an oil depo, which is often registered in multiple districts. Means that multiple owners with multiple Zamyads working in multiple districts.

Before selecting the final model, robustness of the results and multiple model specifications were estimated and compared. The baseline multinomial logit (Model-1) with multiple controls provided only modest explanatory power. An extended version (Model-2) improved fit (after dropping some controls and log ratios taken) nonetheless produced unstable coefficients. A nested logit was also tested to account for possible correlations between alternatives. Nested Logit (Model 3) showed some improvement over the baseline. The nesting structure was statistically weak and did not yield consistent results. In the survey individuals highlighted that the decision to make a specific type of trip does not depend on another individual who performs another type of trip. That is IIA (independence of irrelevant alternatives) holds in UFT. The final specification (Model-4) gave the strongest performance across all diagnostics, with the highest pseudo R² and stable, interpretable coefficients. These comparisons are summarized in the following table

Model	Pseudo R ²	AIC	BIC	Observations	Notes
Model-1 (with multiple limited controls)	0.31	575.2	596.4	240	Lower fit, All variables included
Model-2 (with fewer controls)	0.36	552.1	580.8	240	Moderate improvement, but coefficients unstable
Model3: Nested Logit	0.38	540.7	571.5	240	Improved over baseline, but nesting structure weak
Model-4 (Final, Preferred ML model)	0.43	498.6	515.2	240	More fit, stable & consistent coefficients

Source: Author's

6.4. Results of the Multinomial Logit Model

In the model, the dependent variable is the number of trips (with 1 trip being the benchmark category). The independent variables include the factors that increase the likelihood of performing a specific trip such as kinship relations, age, Zamyads (vehicles used for UFT), distance from the border, illicit activities, experience, and education.

Independent Variables	2 Trips Coefficient	2 Trips Std. Error	2 Trips z-value	3 or More Trips Coefficient	3 or More Trips Std. Error	3 or More Trips z-value
Intercept	-23.56	0.00	102240.80	-3.76	0.00	-13977.40
kinship	-0.07	0.00	-81.33	-0.06	0.00	-63.38
age	-0.06	0.01	-5.09	-0.05	0.01	-3.45
zamyad	-0.44	0.00	-1880.76	1.44	0.00	3920.99
income	0.00	0.00	-1.23	0.00	0.00	0.72
accidents	0.01	0.00	8.94	-0.03	0.00	-29.96
roleinfamily	17.36	0.00	75346.81	-2.35	0.00	-8355.45
hhsiz	-0.09	0.00	-61.92	0.06	0.00	29.84
urband	0.31	0.00	-1663.72	0.62	0.00	-4561.32
highwagepros	-0.22	0.00	-452.79	1.18	0.00	1557.07
extrafee	-0.15	0.00	-155.84	-0.08	0.00	-60.75
lackmarkets	0.02	0.00	26.97	-0.01	0.00	-10.19
lackjob	-0.02	0.00	-234.72	-0.21	0.00	-198.65
savefromchaos	0.24	0.00	1769.18	0.36	0.00	1547.26
docu	-0.24	0.00	-726.04	0.04	0.00	121.29
marginali	-0.39	0.00	-499.43	-0.26	0.00	-297.96
line	-0.28	0.00	-3823.97	1.53	0.00	5059.87
hcapital	0.42	0.00	3438.79	-0.53	0.00	-2665.82
distance	0.00	0.00	0.11	-0.01	0.01	-2.43
illicit	0.16	0.00	279.06	0.35	0.00	817.87
exp	0.05	0.00	29.59	-0.06	0.00	-37.29
edu	-0.07	0.00	-30.89	0.21	0.00	99.71
Pseudo R²: 0.43						
AIC: 498.6						
BYC: 515.2						

Source: Own estimations based on the UFT survey

Results, Discussion and Findings

The above table shows the estimated coefficients, standard errors, and z-values for each independent variable. The results indicate a variety of significant and insignificant relationships between the independent variables and the likelihood of a trader choosing 2 trips or 3 or more trips against 1 trip. Insights for each variable are highlighted in the following paras:

Kinship Relations: At the Pak-Iran border, individuals living on both sides of the border (Pakistan and Iran) share a common language and culture (Balochi), values, and history (Ehsan, 2024). The negative coefficients for both 2 trips and 3 or more trips imply that stronger kinship relations are associated with a lower likelihood of taking multiple trips. This suggests that individuals having their own Zamyad depends more on their kinship relations rather than political support, which results in token arbitrage. They depend more on their cousins or brothers. This also confirms the PT that they are risk averse not keener for profit maximization. (The UFT specific insights are based on the UFT survey).

Distance from Border: The distance from the border has mixed effects, with an insignificant and meagre impact on 2 and 3 trips (drivers). The cost of the transport is not bear by the drivers. A meagre impact on 1 more trip shows that for individuals logistical challenges emerge from the distance for the businesses of a trader. However, the SCA analysis shows that the price varies as the distance changes. Dalbandin and Noshki (Tehsils of Chagai district) are around 500-600 km away from the Border (PBS, 2023). Drivers from those Tehsil gets the tokens and are engaged in the border trade as well (see Table 1 and Table 2). Muhammad (2022) also stated that approximately 2 million people rely on undocumented. However, the population residing in the four bordering districts is around 0.5 million. This, however, suggests that not only the people living near the border are dependent on the border trade, but the rest of the province is also dependent on the border trade. The border provides livelihood to many. Distance from the border does not play any significant role. The prevalence of UFT in Lahore and Islamabad also provide details on the role of distance in UFT.

Age: the negative coefficient shows that older traders are less likely to undertake multiple trips (two or three trips). This is due to the physical demands and risks associated with multiple trips being less appealing or feasible for older individuals (Deléchat & Medina, 2021). Both in Age and Kinship relations Utility theory fails. It fails to explain why an individuals do not move towards more trips or more profit more utility.

Zamyads (vehicles): The significant positive coefficient for 3 or more trips suggests that ownership of more Zamyads increases the likelihood of undertaking multiple trips. More vehicles mean more fuel and more income. Both theories exist here. However, the profit maximization and more utilization of Zamyads factor is more prevalent. In terms of PT drivers keep the high income as their reference point so they take as much trips as possible.

Income: The small and mixed effects of income on trip frequency suggest that income alone is not a strong determinant of the number of trips. As the PT suggests, other factors such as wealth, the setting in the system etc. play significant role. A person may be performing 2 trips per month but his income may be PKR 15,000 in case he is a driver. Another person who has his own car may earn PKR 50,000 per month in case he has his own car and the price differential is high between the border rate and the rate in the adjacent cities.

Accidents: More accidents are negatively associated with the likelihood of making 3 or more trips compare to a single trip, indicating that traders who have experienced more accidents might be deterred from frequent trips due to the associated risks (that is the risk averse behavior explained in PT). As the number of accidents increases the likelihood of taking more trips become lesser. Drivers prefers few trips (1 or 2) and just use UFT to keep bread and butter.

Role in Family: Traders who are the main income earners (role in family) have a significantly higher likelihood of making 2 trips, but a negative association with making 3 or more trips. This may suggest that for three trips you need more supporting family members.

Marital Status: Married traders are less likely to undertake multiple trips, potentially due to greater familial responsibilities and commitments. They prefer family over income or profit.

Household Size: Larger household size decreases the likelihood of making 2 trips but increases the likelihood of making 3 or more trips . Households have more active labor force have high likelihood of making more trips because it helps the driver to get more support from the family. This finding is supported by the findings of Mengstu (2023). Moreover, drivers often perform 2 trips. They work on a wage or income basis hence don't rely on their family size.

Urban Demand: the positive coefficient shows that traders are more influenced by the urban demand of urban centers. They are more likely to make multiple trips. According to the FGDs with the drivers traders react more to the urban demand as compared to individuals. This is in line with the utility theory. In the urban centers, the prices and profits are high. Hence, most of the fuel is traded to other cities or provinces. Meanwhile, individual owners also sell their UFT trips to traders.

Higher Wage Prospects: Higher wage prospects have a mixed effect, decreasing the likelihood of 2 trips (as getting high wages per day) as a driver is quite not possible. Drivers has a fixed income per trip. However, it significantly increasing the likelihood of 3 or more trips. This suggests that the potential for higher earnings incentivize more frequent trips.

Extra Fees: The imposition of extra fees has a negative impact on the likelihood of multiple trips, likely due to increased costs which reduces the profitability. This leads to a risk averse behavior.

Lack of Markets: Lack of markets significantly increases the likelihood of 2 trips but decreases the likelihood of 3 or more trips. This in particular related to the political economy of UFT. In case of fewer markets means that a driver can still perform 2 trips. However, in case of fewer markets more trips are not possible for a trader. Indicate that while the absence of markets may not prompts drivers to make an additional trip, however it acts as a constraint on making too many trips.

Lack of Government Jobs: The lack of government jobs negatively impacts the likelihood of making multiple trips. According to the FGDs while traveling in Zamyads with the respondents, they stated that alternative employment opportunities are not available to individual Zamyad owners and drivers. The job factor more attracts individuals and drivers (the coefficient for the drivers is very low: 0.02). As a result, UFT acts as a strategy for their survival. Thus they go towards informal channels of employment like UFT.

Perception of Chaos: Traders who believe that the borders save them from chaos are more likely to undertake multiple trips, possibly seeing UFT as a safer or more stable option. They invest their income in a safe environment. Border closures have adverse effects in the region. It result in joblessness, poverty, hunger which alternatively leads to chaos, terrorism, and over instability.

Documentation: Documentation influences 2 trips but slightly more towards 3 or more trips. This is due to the ownership of tokens to cross the border. People who carry more trips does not want go towards documentation. They prefer undocumented channels. Undocumentedness attracts them towards UFT. Less documentation more informal income.

Marginalization: Perceptions of marginalization negatively impact the likelihood of making multiple trips, suggesting that feelings of grievance might discourage the formal economy. However, those who make multiple trips earn comparatively high wages. Thus, marginalization is not a significant determinant for them. Such psychological factors also attracts individuals towards UFT as described in PT.

Settled UFT Line: Having a settled line of UFT significantly increases the likelihood of making 3 or more trips, indicating that established smuggling networks facilitate frequent trips. This is thorough in line with the political economy of UFT as there is only one trip allowed per month. Multiple trips are not possible without a settled line.

Human Capital: Underdeveloped human capital is positively associated with making 2 trips but negatively with making 3 or more trips, indicating that lower skills might prompt some additional trips but also act as a constraint on frequent trips. Drivers and traders associated with 3 or more trips do not consider human capital a significant determinant as they are not attracted towards human capital related jobs of government or private jobs which require human capital. Thus, don't consider it a significant determinant.

Illicit Activities: Incentives for illicit activities nonetheless increase the likelihood of multiple trips for traders. However, for individuals there is less likelihood to conduct illicit activities using UFT as, for them, UFT is a source of sustenance. There are very few income choices with an underdeveloped agriculture industry in the border region. Globally, regions where illicit activities or black markets like narcotics prevail, have a developed/high living standard, unlike Balochistan (Edwards, 2010).

Experience: More experience slightly increases the likelihood of making 2 trips (drivers) but decreases the likelihood of making 3 or more trips as compared to 1 trip, indicating that seasoned drivers are needed for this activity. Doing this difficult activity is not quite possible without experience. Moreover, the occurrence of this activity indicates that this activity is not new at the border but has been happening since years. An experienced person chooses to become a driver and individual trader rather than becoming a businessman (3 trips), although it's a very tough job. UFT is a tough job which requires experience.

Education: Higher education decreases the likelihood of making 2 trips but significantly increases the likelihood of making 3 or more trips, suggesting that better-educated traders might pursue more frequent trips. A better educated individual is less likely to become a driver.

Kirabaeva & Kedina (2022) empirically estimated the drivers of the informal economy in European countries. They find that regulatory quality, poor economy, and tax burden tend to be associated with higher informality. Factors such as trade openness and higher productivity are associated with lower informality. Similar insights are provided by the model of this study. Theoretical implications are provided in Subsection 6.6.

6.5. Impact of UFT on the residents of the borders

As the trade theories state that trade uplift an economy as a whole. A question emerges here is that whether the UFT impacts the residents of the border region likewise or not? This question still requires an exploration. This segment aims to explore (on micro-level) the trade theory persists in UFT or not. Moreover, it further aims verify the arguments provided in the above sections about the significant impact of UFT. Since no acid test available to verify these impacts. The following segment provides such information based on the primary data.

Respondents Working in UFT:

Table 6: Descriptive Statistics of UFT Respondents					
Variable	S.D	Mean	Max	Min	Med
Education	2.22	8.30	16	00.00	8.00
Trips	0.84	1.61	3.00	1.00	1.00
Age	8.70	35.75	61	19	35
UFT Experience	3.61	5.50	30	1	5
Distance from border (approx. in km)	43.20	90.25	440	15	85
<i>Source: Author's estimation based on the UFT survey</i>					

Table 7 provides descriptive statistics of the number of years of education completed, the number of trips carried by the UFT drivers per month, the Age (in years), years of experience, and distance (in kilometers) of the respondents/UFT drivers working in UFT.

Table 7: Demographic Results					
Marital Status	Single (0)			Married (1)	
	116			124	
Past employment	Driver	Other	Same		
	79	82	79		
If you leave this job, do you think you will be able to get a new job?	Don't Know	No	Yes		
	85	112	43		
Kinship Relations	No	One	Two	Three	Four
	15	33	47	60	85
<i>Source: Author's estimation based on the UFT survey</i>					

Table 7 and 8 above shows the characteristics of the respondents. It provides further information about kinship relations, marital status, past employment, and future jobs of UFT participants. The proportion of married persons is marginally higher than that of single. However, the proportion of educated persons is lower (mean education: 8 years). Moreover, a considerable proportion of the

participants are presently engaged in employment. A small proportion of the respondents who are presently engaged in UFT had prior employment other than a driver. Furthermore, the majority of the respondents have UFT experience. The majority expressed uncertainty about future employment. They express a lack of certainty in their ability to obtain a new job after leaving UFT. Further individual responses about the specific impacts of UFT are discussed hereunder. They explore that which theory persists in UFT and what socioeconomic impacts it leaves on the UFT participants.

Contribution of UFT in Economic Stability

This question explores what are the respondents’ perception about the impact of UFT on local economic stability. Majority of the respondents indicated significant contribution of UFT in economic stability.

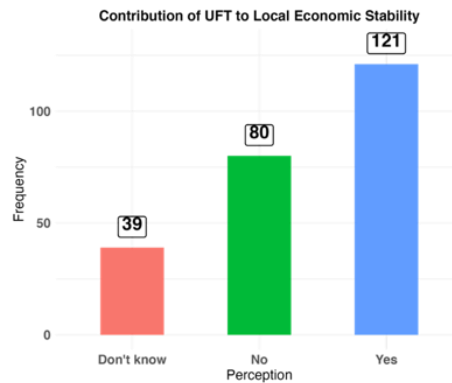


Figure 4: UFT Contribution in Economic Stability

Source: Author's

Discussion

The above figure shows that UFT contributes to local economic stability in Balochistan. In areas where fuel supply is irregular or expensive due to government regulations or market inefficiencies, UFT provides economic stability by providing regular jobs (Khosravi, 2022). This study (in Table 1 and Table 2) also highlighted that a significant population of Balochistan rely directly and indirectly on UFT since it is a source of living as well as a reason to economic stability. In Southeast Asia, Wang (1994) has highlighted similar impacts of UFT. In Africa (Nigeria and its neighboring countries) UFT provides regular employment opportunities to individuals who would otherwise face unemployment due to limited job opportunities (Wang, 1994). According to Muhammad (2022) and Shah (2024), in Balochistan, border closure often results in an unstable economy, thefts, economic turmoil due to unavailability of alternative employment opportunities .

Pakistan’s employment statistics [LFS (2021)] also states that UFT acts as a source of livelihood for many households in the bordering regions.

Findings

This study finds that a significant majority perceive UFT as beneficial. The socioeconomic outcomes show dependence on UFT. The local economy benefits from increased trade activity, enhancing income generation and circulation. Employment reflects the mobilization of the labor force to meet trade-related demand, supporting labor force participation and reducing idleness. Cheaper fuel sources lower household and business costs, while the resulting price level effects can stabilize inflation informally. An increase in trade volume and mobility points to expanded economic opportunities and access. Both consumers and supplier fulfill their economic needs/wants by exploiting price differentials. Hence the UFT participation can be viewed as economic gain that provides economic stability.

Impact of UFT on the standard of living

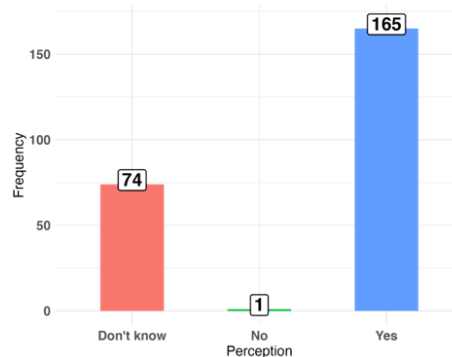


Figure 5: Impact of UFT on Standards of Living

Source: Author's

The responses show varying perceptions among respondents regarding whether UFT can improve the standard of living. A majority (165) stated that UFT can improve standard of living.

Discussion

The majority of respondents (165) believe that UFT has the potential to improve the standard of living. A significant number (74 respondents) are unsure or have mixed opinions. In this study, the multinomial logit model stated that the impact of UFT is dynamic due to its multiple determinants. During UFT supply chain exploration, multiple drivers stated that “for many UFT improves the standard of living by acting as a regular income source. Meanwhile, some individuals just take UFT as an ordinary job. In case of accidents or other uncertain events, even this only source of

living is lost.” Hence for them UFT does not play any significant role in improving standard of living due to the uncertainties and the risks (such as the accidents) grappling the UFT.

Findings

This study finds that, through income, wages, and by providing energy security, UFT impacts the economy. It also has the potential to improve the standard of living of the whole UFT population, if the uncertainties and the risks grappling the UFT are removed and a formal sustainable border trade setup is ensured.

Impact of Fuel Scarcity on the region

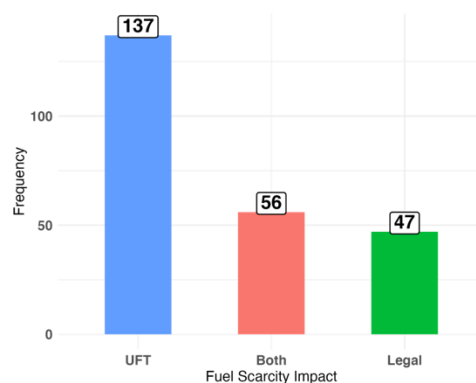


Figure 6: Fuel Scarcity

Source: Author's

UFT is an integral part of energy security of a country. The above explores the role of UFT in the energy security. The responses indicate the perceived impact of fuel scarcity on the area studied, distinguishing between UFT, legal fuel sources, or both—that is, which fuel impacts more?

Discussion

The above data provides a clear picture of how different fuel sources are perceived in terms of their impact on fuel availability in the region. It is evident that UFT plays a dominant role in the fuel supply chain, as reflected by the 57% of respondents who perceive it as the primary contributor to fuel scarcity. This indicates a significant reliance on UFT, likely due to factors such as lower prices and easier accessibility compared to legal fuel (Karmanin, 2016). The moderate frequency of respondents (23%) attributing the scarcity to both UFT and legal sources suggests that while UFT is significant, the legal fuel supply is also insufficient to meet demand. Meanwhile, the 20% of respondents who see legal sources scarcity alone matters for them highlight significance of legal fuel sources. Dawn (2025) also highlighted that shortage of UFT impacts the Balochistan more as compared to the legal fuels.

Findings

The findings from this data reveal several key insights. Firstly, the predominance of UFT in the fuel supply highlights its critical role and suggests that any efforts to address fuel scarcity must account for the informal sector. Secondly, the significant number of respondents acknowledging the impact of both UFT and legal sources underscores the interdependence of these markets and the need for comprehensive policy interventions that address both. Lastly, the recognition of legal fuel supply issues by a portion of respondents indicates a need for regulatory bodies to focus on improving the efficiency and affordability of legal fuel distribution to better meet public demand. Overall, both fuels are important. For few respondents who have faces the shortage of legal fuels consider them important while a major portion underscores the importance of UFT.

Contribution of UFT to Household Food Security

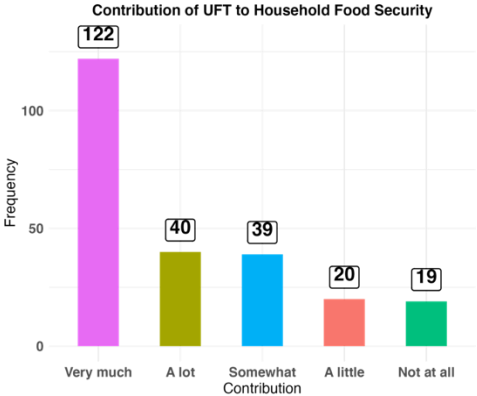


Figure 7: Food Security
Source: Author's

Whether this significant prevalence of UFT play any role in the food security of the border regions? Except 19 individuals all the respondents stated that UFT helps in food security as the majority of respondents reported that UFT has contributed “Very much” to their household’s food security.

Discussion

The data presents the perceived contribution of UFT to household food security, with a significant portion of respondents (122) indicating that UFT contributes “Very much” to their household food security. This strong positive response suggests that UFT plays a crucial role in sustaining livelihoods and ensuring access to food for many households. The findings align with Raheem (2022), who also highlighted the economic importance of UFT in supporting household needs in border regions. Additionally, although UFT helps many people access food, its informal nature exposes participants to risks like unstable income and intermediary exploitation (Younus, 2024).

Findings

Insights into the contribution of UFT to household food security are here. Respondents show that UFT contributes “Very much” or “A lot” underscores the dependency of many households on this trade for their sustenance. This shows the role of UFT as a key economic activity. Hence, it supports food security in border regions. The responses (some indicating only moderate or slight contributions), suggest differences in how households benefit from UFT. Potentially due to varying levels of involvement or access to the trade.

Impact of UFT on Accumulating Assets

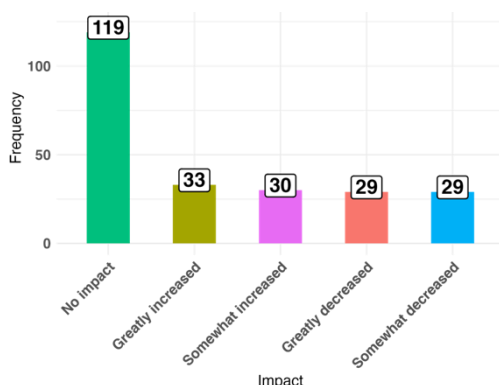


Figure 8: Impact of UFT on Asset Accumulation

Source: Author's

Landman (2022) argues that undocumented channels like UFT or savings groups provide immediate economic relief, their long-term contributions to financial stability and asset-building are inconsistent. Moreover, Younus (2024) states that black markets thrive due to UFT. Significant accumulation of assets are made in such black markets. This question explores this issue.

The results explain how involvement in UFT has affected respondents' ability to accumulate assets such as land or housing. The most common response was “No impact”, followed by “Greatly increased”, and “Somewhat increased”.

Discussion

While UFT contributes to immediate household needs, its effects on long-term investments or asset building are limited for a large group. Conversely, 33 respondents noted that UFT “Greatly increased” their ability to accumulate assets, highlighting that for some, UFT provides substantial economic benefits that extend beyond daily necessities.

UFT is an undocumented business. Some traders while exploiting the locals use UFT as a blanket for their black-market activities. In such cases the premium is high. For such individuals UFT acts as a source of asset accumulation. Moreover, Balochistan is lagging in terms of its development

indicators. In social and living standards, consumption, GDP, and HDI Balochistan is far below than the rest of the provinces (Shah, 2023).

Findings

The findings reveal a complex picture of how UFT affects asset accumulation. The responses indicates that for many, UFT’s influence does not extend to long-term economic gains such as land or housing. This suggests that while UFT may provide short-term financial relief, it does not consistently translate into asset building for a substantial number of households. However, the notable proportion of respondents reporting “Greatly increased” asset accumulation points to significant benefits for a subset of individuals engaged in UFT. These findings underscore the need for targeted policies that address the diverse economic impacts of UFT; opportunities for the marginalised population.

In order to provide a way forward, the following questions explore the characteristics of UFT and the potential solutions to the UFT conundrum.

Social Acceptance of UFT

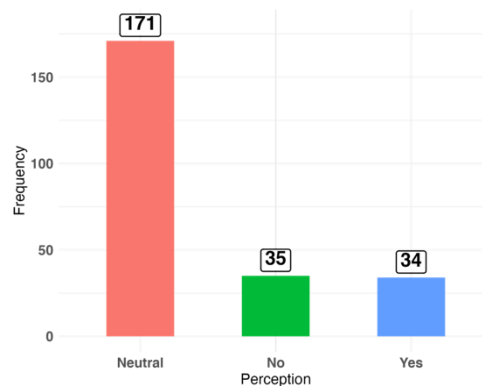


Figure 9: Social Acceptance of UFT

Source: Author's

The responses indicate mixed perceptions regarding the social acceptance of UFT. However, a majority of respondents (171) agree that UFT is socially accepted to some extent.

Discussion

The results suggests that within border regions, UFT is normalized or tolerated as a means of economic survival or due to socio-cultural factors. 34 respondents disagree or unsure or have mixed opinions about the social acceptance of UFT highlighting its condemnation in some circles. Karjanen (2011) suggests that UFT is perceived differently depending on local context and economic necessity. However, in Pakistan, the Smuggling Act of 1977, which considers UFT

illegal, does not fully account for the UFT socio-economic realities as well as its social acceptance. Muhammad (2022) states that the law, like any social institution, is often shaped by multiple factors such as geography, culture, power, and politics. A rigid legal/illegal definition of UFT does not always hold in practice. Defining UFT requires further elaboration taking into account the social acceptance conundrum.

Findings

The study highlights diverse attitudes towards the social acceptance of UFT among respondents. While many perceive UFT as socially accepted to some degree, others express reservations or uncertainty about its societal legitimacy. Understanding these perceptions is crucial for addressing the socio-cultural dimensions of UFT and designing effective strategies to promote lawful and sustainable economic activities in affected regions. This finding suggests the need for a comprehensive reevaluation of legal frameworks to align them with the current realities of informal trade practices. There is a pressing need for more effective enforcement mechanisms and a legal redefinition of UFT that considers its socio-economic/cultural dimensions. In conclusion, legality or illegality is a relative concept. Further definition of the legality aspect is required

Job Mobility in UFT

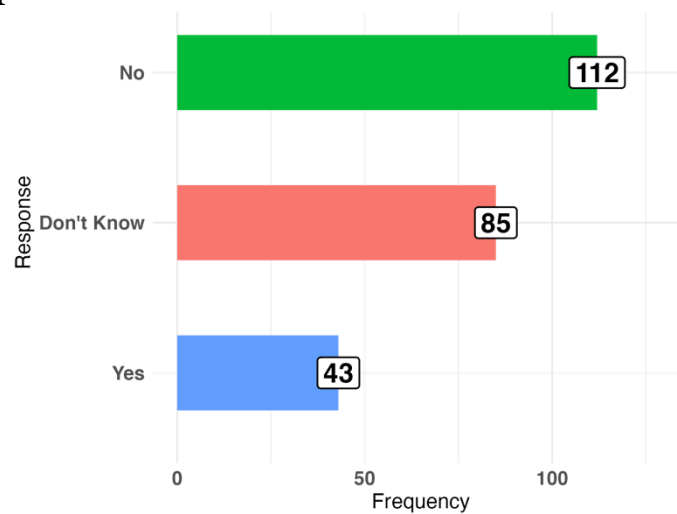


Figure 11: Job Mobility

Source: Author's

The responses state varied perceptions regarding job mobility if one want to leave their current UFT-related job. A significant number (112 respondents) indicates that they do not believe they would be able to find a new job, while 85 respondents were uncertain (Don't Know), and 43 respondents expressed confidence in their ability to secure a new job.

Discussion

The distribution of responses reflects uncertainty (God knows better) and perceived barriers to job mobility among individuals engaged in UFT-related employment. Factors such as instable economic conditions and the informal nature of UFT-related jobs may contribute to such responses (Najeeb, 2022). The mixed responses regarding job mobility reflect a broader uncertainty surrounding the future prospects of individuals involved in UFT. A significant portion of respondents (112 out of 240) expressing doubts about securing a new job suggests that employment within UFT is perceived as relatively stable yet limited in terms of long-term career advancement. The instability of the informal economy, with its lack of legal protections and job security, contributes to this sentiment. Additionally, the lack of job mobility can be attributed to the skills mismatch and limited human capital development in UFT. Respondents who are uncertain or pessimistic about finding a new job might lack transferable skills, further constraining their employment options. This aligns with findings by Shah (2021, who highlighted that individuals engaged in informal labor markets often struggle with skill development due to the transient and low-skill nature of such jobs. Farhan (2022) argue that a significant barrier to economic mobility in border communities is the limited availability of educational infrastructure, which prevents workers from upskilling and transitioning to higher-paying formal jobs.

Findings

The study uncovers that a large proportion of respondents in UFT feel uncertain about their job prospects outside the current trade, highlighting the barriers to economic mobility within the informal economy. This suggests that transitioning away from UFT-related work could be challenging for many, potentially perpetuating cycles of poverty and dependence on informal sectors. This also underscores the need for supportive policies and economic opportunities in affected regions.

Wealth Disparity in UFT

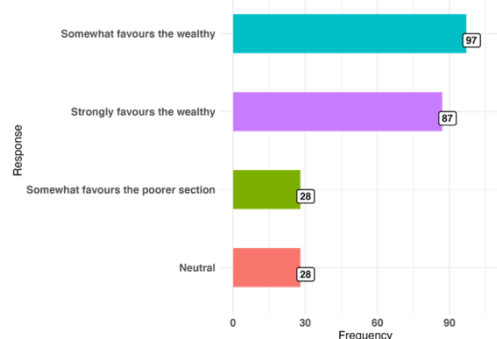


Figure 12: Disparities
Source: Author's

The responses indicate a perception among respondents that UFT tends to favor the wealthy over the poorer sections of society. Specifically, 87 respondents strongly believe UFT strongly favors the wealthy, while 97 respondents think it somewhat favors the wealthy. On the other hand, 28 respondents each indicated a neutral stance and that UFT somewhat favors the poorer sections.

Discussion

The distribution of responses suggests a nuanced understanding of wealth disparity in the context of UFT. The majority perception that UFT benefits the wealthy aligns with broader socio-economic patterns where informal economies can exacerbate inequalities. Concern about big businesses or the an undocumented economy in favor of some wealthy individuals also raised by Younus (2024). Moreover, many individuals in the FGDs stated that in permits (Zamyad entry) wealthy families got preference by the DC office.

Findings

The study highlights a significant perception among respondents that UFT disproportionately benefits the wealthy. This perception underscores some potential socio-economic disparities exacerbated by UFT and suggests a need for policies that mitigate these disparities and ensure equitable outcomes for all sections of society affected by UFT.

House Types in UFT Areas

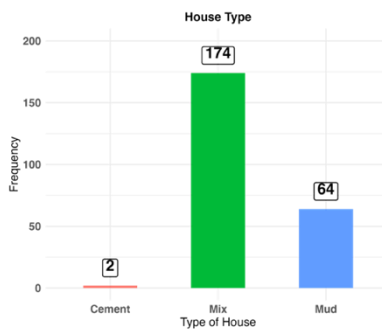


Figure 13: House Type
Source: Author's

The respondents show multiple house types in the border regions. The majority of respondents reported living in houses categorized as “Mix” (combination of mud, bricks, and some cement), followed by “Mud” houses. A smaller number of respondents mentioned living in “Cemented/concrete” houses.

Discussion

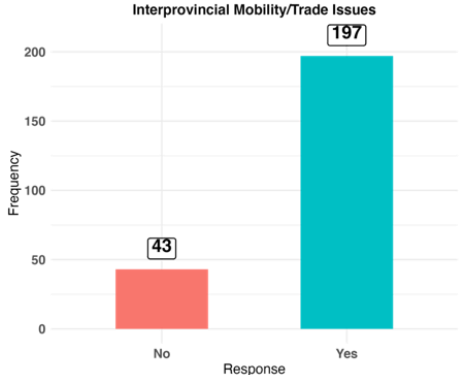
The distribution of house types reflects the diverse socio-economic conditions and construction practices in regions affected by UFT. The prevalence of mud houses suggests traditional building materials due to underdeveloped economic factors. The substantial use of mud suggests the underdeveloped condition of the border district. Similar findings provided by the PSLM (2020) and PBS (2024). Moreover, it highlights the reliance on traditional building materials, which indicates the region’s underdevelopment. This underdevelopment is characterized by inadequate infrastructure and the absence of viable economic opportunities.

Findings

The results highlight the predominance of both mix and mud houses among respondents in UFT areas, highlighting the need for infrastructure that addresses housing needs and promotes sustainable building practices. The substantial use of mud as a primary construction material underscores the economic hardships in the border districts. It further ends up in these regions’ low-standard living conditions and underdevelopment challenges.

Interprovincial Mobility/Trade Issues

Question Type: Yes/No



*Figure 14: Interprovincial Mobilty
Source: Author's*

The majority of respondents (197 out of 240) reported experiencing problems in interprovincial mobility or trade related to UFT. Only 43 respondents indicated no issues in this regard.

Discussion

The results highlights significant issues with interprovincial mobility or trade among respondents engaged in UFT. The widespread challenges in interprovincial mobility or trade attracts people towards other channels of trade other than documented (Khan, Z. A., 2020). These interprovincial regulatory barriers, infrastructure limitations, or other factors hinder the documented movement of goods and people across provincial boundaries. However, an important determinant highlighted

in the survey during the FGDs with the UFT drivers is that the people living in the border regions also prefer jobs in the border regions. Unlike other regions like rural Punjab and Sindh, people living in Balochistan prefer a job near their home rather than moving to the metropolitan cities of Pakistan due to their attachment to their province.

Findings

Addressing the inter and intra-provincial mobility challenges could potentially facilitate more efficient and formalization of trade practices. This moreover highlights the strict regulatory environment in the border regions. Many illicit goods flow using undocumented channels thanks to the bribe. Documentation can mitigate such channels as well and reduce informal taxes. Migration can also help in skill development and reduce regional disparities.

Other Sources of Income Besides UFT

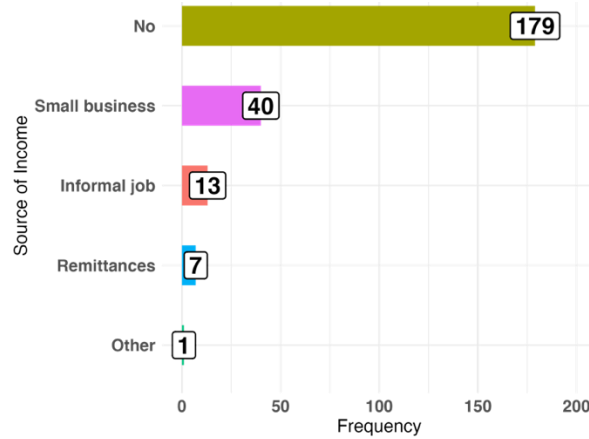


Figure 10: Other Sources of Income Besides UFT
Source: Author's

The responses shows perception about other sources of income outside UFT. The majority (179) reported having no other sources of income besides UFT. However, some respondents respond small businesses, remittances, informal jobs, and other sources as supplementary income sources.

Discussion

The distribution of responses reflects the absence of economic diversity and reliance on UFT income stream among respondents involved in UFT. A significant number depend solely on UFT and informal trade, however, some others also engage in small businesses, receive remittances to supplement their income. The result of Lashari (2021) also revealed the absence of alternative jobs in Balochistan. Which attract people towards oil smuggling.

This underscores the dependence on UFT as a crucial livelihood strategy, particularly in regions where formal employment opportunities are scarce. The absence of alternative income sources highlights the economic vulnerability of individuals involved in UFT, especially in regions where opportunities for formal employment are limited. Lashari (2021) similarly found that in Balochistan, a lack of viable economic alternatives contributes to a reliance on informal sectors such as oil smuggling. This trend is indicative of broader structural issues in these economies, including the lack of sufficient formal job opportunities and limited access to education and skills development, which often drive individuals toward illicit or informal employment like UFT.

Findings

The result and discussion highlights the economic circumstances of individuals involved in UFT, with many relying exclusively on this activity for income while others diversify their earnings through small businesses, remittances, and informal jobs. Targeted interventions that address economic vulnerabilities and promote multiple sustainable income streams in the border regions.

Support for Stopping UFT

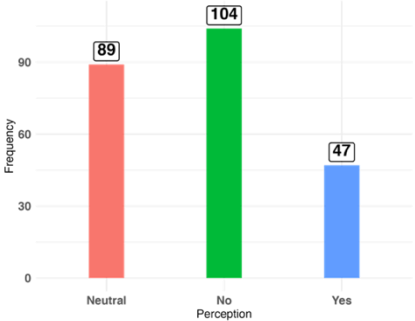


Figure 11: UFT Support
Source: Author's

The responses indicate varied opinions among respondents regarding stopping UFT.

Discussion

A significant number of respondents (104) are against stopping UFT, suggesting that they do not support efforts to halt this activity. On the other hand, 47 respondents expressed support for stopping UFT, indicating a willingness to cease or regulate these informal trade practices. Additionally, 89 respondents are neutral, reflecting ambivalence or mixed feelings about taking a definitive stance on this issue. In the FGDs, the respondents stated that the region requires a stable income stream. It does not matter if it is documented or undocumented.

Findings

The study highlights diverse attitudes towards stopping UFT among respondents. While some oppose efforts to halt UFT, others advocate for measures to address or eliminate this informal trade. Understanding these perspectives is crucial for developing effective policies and interventions that balance economic interests with regulatory and environmental concerns related to UFT.

Perception on Reducing Import Duties to Decrease UFT

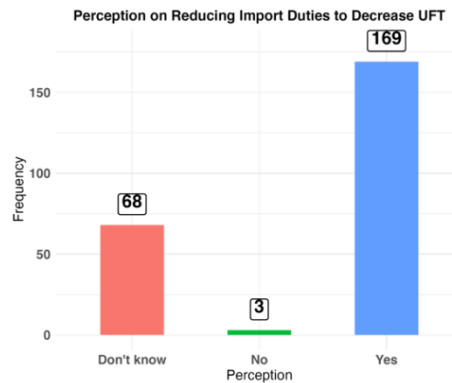


Figure 12: Perception Regarding Reducing Import Duties
Source: Author's

The responses indicate strong agreement among respondents regarding the potential impact of reducing import duties on legal fuels to decrease UFT.

Discussion

A significant majority of respondents (169) believe that reducing import duties on legal fuels would effectively decrease UFT. This perception suggests that economic incentives, such as lower import costs, could deter individuals from engaging in informal and often illegal UFT practices. Only a small number (3 respondents) disagree with this view, while 68 respondents are unsure or hold mixed opinions on this issue. The strong agreement among respondents regarding the potential effectiveness of reducing import duties on legal fuels to reduce UFT aligns with economic theory that suggests price sensitivity plays a significant role in consumer behavior. By lowering import duties, the cost of legal fuels could be reduced, making them more competitive relative to illicit fuel alternatives, thereby discouraging participation in UFT. This concept is supported by similar findings in various regions, where reducing taxes on fuel has been shown to lower the volume of smuggling and informal trade. For instance, in countries like Nigeria and Venezuela, where fuel subsidies and tax reductions have been explored as means to combat fuel smuggling, results showed varying degrees of success in reducing illicit trade by improving the price competitiveness of legal fuels. More studies have highlighted the role of market distortions created by high taxes and duties, which make illegal trade more attractive. By reducing the

economic incentive for smuggling, governments could not only curb UFT but also increase revenue from the formal sector, improving national economic stability .

However, UFT creates challenges. Reducing import duties may have fiscal implications for governments that rely heavily on these revenues. Therefore, a careful balance is needed, ensuring that such policies do not undermine the state’s ability to fund public services or maintain infrastructure.

Findings

The study underscores the perceived link between import duties on legal fuels and the prevalence of UFT. Many respondents view reducing import duties as a viable strategy to mitigate UFT activities, highlighting the potential role of economic policies in addressing informal trade practices and promoting compliance with legal frameworks. Understanding these perceptions is crucial for shaping effective regulatory measures and economic incentives aimed at curbing UFT while fostering sustainable economic development.

In conclusion, this study suggest that reducing import duties could be an effective measure to decrease UFT, although it must be part of a broader, multifaceted approach to address the root causes of UFT, such as regulatory inefficiencies and economic inequality.

Can Formalizing UFT make improvements

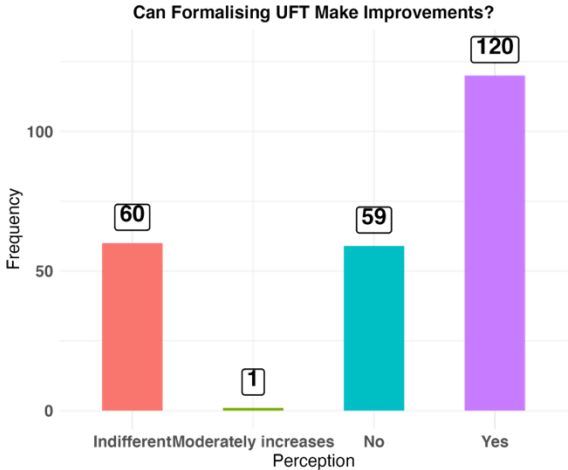


Figure 13: Formalization
Source: Author's

The responses indicate varied perceptions regarding the potential impact of formalizing fuel trade on improving livelihoods.

Discussion

A significant number of respondents (120) believe that formalizing the fuel trade could positively impact their livelihoods. This perception suggests that formalization might bring economic benefits or stability to individuals engaged in UFT. On the other hand, a notable minority (59 respondents) do not share this view, expressing skepticism or concerns about the efficacy of formalization. Additionally, 60 respondents are indifferent, indicating ambivalence or mixed feelings about the potential benefits of formalizing UFT.

During the field visit the respondents highlighted that before the token regime the UFT was more accessible to many. Now, only those who have more resources easily gets tokens. Like the tokens, the formalization may result in huge fees and licensing issues. Any formalization should address these issues as well. According to a PIDE study, 18 NOCs are required to run a fuel trade business (petrol pump) (Haq & Waqar, 2023).

Findings

The study highlights diverse attitudes towards the formalization of fuel trade. While some perceive formalization as beneficial, others are uncertain or pessimistic about its potential to improve livelihoods. The argument provided in support of the non-formalization was that if it is formalized then local population would not be allowed.

Skills Required to Transition to Formal Employment

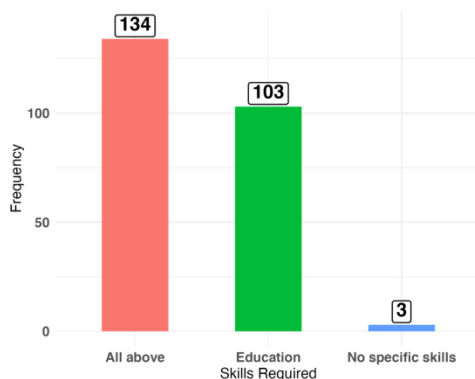


Figure 14: Skills Required to Transition to Formal Employment

Source: Author's

A significant number of respondents (134) believe that all the skills listed (including educational qualifications) are necessary for transitioning to formal employment from UFT.

Discussion

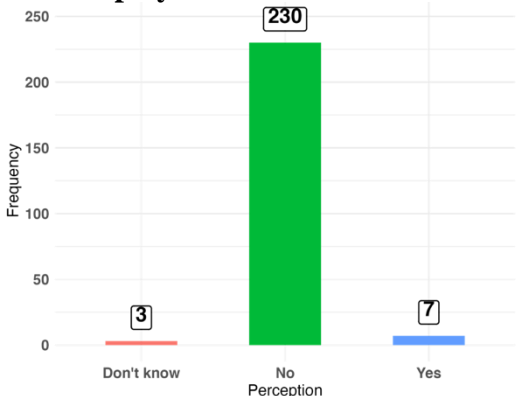
The responses state the perceived skills required for transitioning from UFT to formal employment. This suggests that respondents recognize the importance of education and possibly other specific

skills in accessing formal job opportunities. However, a substantial minority (103 respondents) specifically highlighted educational qualifications as crucial for this transition. Only a few respondents (3) indicated that no specific skills are required, indicating varying perspectives on the prerequisites for moving into formal employment.

Findings

The study underscores the perceived importance of educational qualifications and possibly other skills in facilitating the transition from UFT to formal employment. Understanding these perceived skill requirements is essential for designing education and training programs that support individuals engaged in informal economic activities in enhancing their employability and accessing sustainable livelihood opportunities.

Preference for Informal Sector Employment



*Figure 15: Formal Employment
Source: Author's*

The responses indicate a strong preference against working in the informal sector compared to the formal sector in the respondents' area.

Discussion

The majority of respondents (230) do not consider working in the informal sector as a better option compared to the formal sector. This perception suggests that formal employment is generally perceived as more desirable due to factors such as stability, benefits, and legal protections. On the other hand, a small number of respondents (7) indicated a preference for the informal sector, possibly influenced by perceived flexibility or income potential. Additionally, 3 respondents were uncertain or had mixed opinions on this issue.

This preference for formal sector employment over informal sector work aligns with global UFT trends. Workers favor jobs with stability, legal protection. The formal sector relatively provide job security and a more predictable income, which are often absent in the informal sector such as the

UFT. The small percentage of respondents favoring the informal sector might value its flexibility and potentially higher short-term income prospects. However, informal employment is typically associated with risks like job insecurity, lack of social protections, risks of losing life, and exposure to exploitation.

Findings

This preference underscores the importance of formal job creation policies and strategies that make formal employment more accessible and attractive, such as reducing barriers to entry, enhancing education and skills training, and improving regulatory frameworks. Likewise, the study highlights a prevailing preference for formal sector employment over the informal sector among respondents in the area studied. Understanding these preferences is crucial for addressing economic disparities, promoting formal job creation, and enhancing the quality of employment opportunities available to individuals currently engaged in informal economic activities.

Preference for Switching to Formal Sector

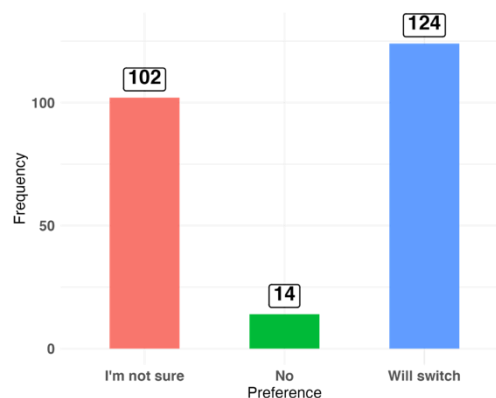


Figure 16: Preference for Switching to Formal Sector
Source: Author's

The responses indicate mixed preferences regarding switching from informal sector employment to the formal sector, given similar salary and conditions.

Discussion

A significant number of respondents (124) expressed a willingness to switch to the formal sector if offered similar pay and conditions. This indicates a desire for the stability, benefits, and legal protections often associated with formal employment. On the other hand, 14 respondents indicated they would not switch, possibly due to preferences for the flexibility or autonomy found in informal work. A considerable portion (102 respondents) were unsure or had mixed feelings about

making this transition, reflecting uncertainties or considerations about potential changes in work environment or job security.

Such responses moreover highlight a complex interplay of economic and social factors. The literature suggests that individuals often view formal employment as attractive for its perceived stability (as stated earlier). However, informal employment also offers certain advantages such as flexibility, autonomy, and sometimes provides jobs to those who do not have a viable income source in the formal sector. Such UFT facets make the transition less appealing for some workers.

Additionally, barriers such as lack of trust in formal systems, perceptions of bureaucratic inefficiency, or fears of losing existing social inequalities may play a role. Hitherto, undocumented fuel traders face constant challenges from authorities in times of emergencies or insurgencies, necessitating adaptive strategies to sustain their operations, requiring the traders to innovate and find new routes continuously, altering transportation means, and modifying payment processes to maintain their financial viability, making these informal practices of a temporal nature (Najeeb, 2022; Keshavarz, 2022; Daimon, 2023).

Moreover, when the formal economy (as in the case of Pakistan) struggles with issues like stagnant wage growth and limited opportunities, it may fail to attract workers from the informal sector. Studies have found that improving the conditions and inclusivity of the formal labor market, such as offering flexible work arrangements or removing excessive entry barriers, can encourage more individuals to transition to formal employment.

Findings

Multiple complexities and varied preferences among individuals engaged in informal sector activities regarding transitioning to formal employment. It suggests that the state of formal economy is not good. Thus, people are reluctant towards formalization.

This situation emphasizes the need for policy interventions targeting both sectors. For the informal economy, policies could focus on ensuring basic rights and protections, while the formal economy could benefit from reforms aimed at increasing accessibility, enhancing worker satisfaction, and ensuring equal and competitive benefits. (Many respondents stated that in the formalization the issue of cartels and elite capture should be addressed).

In the literature, border markets are often viewed as a solution to UFT in areas like Balochistan. Hence, the concept of border markets explored in the following questions.

Cons of a Border Market

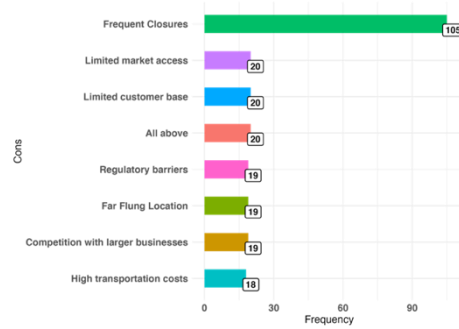


Figure 17: Cons of a Border market

Source: Author's

Various concerns regarding a border market, with a significant number of respondents (105) selecting “Frequent Closures”, indicating as a major concern.

Discussion

The table above outlines several disadvantages of border markets, with frequent market closures being the most significant concern, noted by 105 respondents. This instability hampers business operations and economic stability, as highlighted by Ehsan (2024).

Other challenges include limited market access and a small customer base, mentioned by 20 and 19 respondents, respectively. High transportation costs and competition from larger businesses further impede the growth of smaller enterprises. Regulatory barriers, also cited by 19 respondents, restrict efficiency and profitability in border markets.

Frequent closures often result from geopolitical tensions, regulatory unpredictability, and poor coordination between neighboring countries (Bhardwaj, 2020), disrupting supply chains and undermining trader confidence. Moreover, inadequate infrastructure exacerbates logistical challenges, discouraging long-term investments (Ranjan & Singh, 2021).

Complex cross-border regulations favor larger enterprises, making it difficult for small traders to navigate permits and tax compliances (Ahmad et al., 2019). Addressing these issues requires targeted regulatory reforms and infrastructure investments in border areas.

Findings

The findings from this data provide several key insights into the cons of operating in border markets. Firstly, the prominence of frequent closures underscores the need for more stable and predictable market conditions to support business continuity. Secondly, the challenges of limited market access, customer base, and far-flung locations suggest that improved infrastructure and connectivity are essential for these markets to thrive. High transportation costs and competition with larger businesses further highlight the economic pressures faced by small traders. Lastly,

regulatory barriers indicate a need for streamlined policies and support from authorities to facilitate smoother operations in border markets. Addressing these issues could lead to more robust and resilient border economies, benefiting local traders and the broader economic landscape.

Pros of a Border Market

These results highlight various perceived advantages of a border market, with a significant number of respondents noting “All above” as a comprehensive positive aspect.

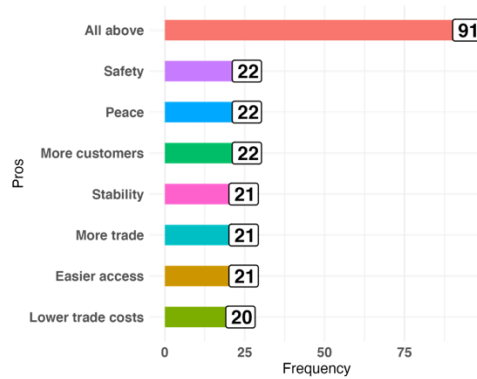


Figure 18: Pros of a Border Market
Source: Author's

Discussion

The above positive outlook towards the border markets suggests that respondents recognize a combination of factors contributing to the attractiveness of border markets. Enhanced trade opportunities, peace, safety, and an increased customer base were each noted by respondents. Muhammad (2022) also highlighted similar advantages, emphasizing how these factors can collectively create a favorable environment for trade and economic activity. Easier access, stability, and lower transportation costs, each mentioned by around 21 respondents, further underscore the practical benefits that make border markets appealing.

Findings

The findings from this data reveal several key insights into the pros of operating in border markets. Firstly, the high frequency of respondents recognizing all listed advantages underscores the overall positive sentiment towards border markets. The acknowledgment of enhanced trade opportunities, peace, safety, and an increased customer base as significant benefits highlights the potential for economic growth and community stability in these areas. Additionally, the emphasis on easier access, stability, and lower transportation costs points to the practical and logistical benefits that support business operations. These advantages suggest that border markets play a vital role in

promoting trade and economic development, providing a robust platform for local businesses to flourish.

6.6. Theoretical Reflections

This study examines the UFT in Pakistan. The analysis was guided by three prominent theoretical frameworks. International trade theories, Rational Choice Theory, and Prospect Theory¹⁵. The findings suggest that all three remain relevant. Their explanatory strengths lie in different dimensions of UFT participation. The details of how each framework contributes to this understanding are provided hereunder, forming the theoretical conclusion of this study.

Rational Choice Theory and Utility Maximization

The decision to prefer cheaper undocumented fuels over more expensive documented alternatives is consistent with the logic of utility maximization embedded in RCT. Participants weighed the direct economic benefits of undocumented fuel lower prices, immediate availability, and reduced transaction costs, against the potential risks of engaging in informal activity. Given the weak enforcement capacity of state institutions and the pressing livelihood needs of border communities, UFT emerged as a rational and utility-maximizing choice.

This outcome reflects the broader economic rationality highlighted by Allingham and Sandmo (1972) and aligns with the utilitarian foundations laid by Bentham and Pareto. The financial burden of high fuel prices, limited employment opportunities, and economic instability in Balochistan reinforced the RCT expectation that individuals will act in ways that enhance personal or household welfare when the benefits of doing so outweigh the potential costs. Thus, RCT provides a strong theoretical anchor for the economic dimension of UFT.

Prospect Theory

However, based on logit model, there is evidence to show that rational utility maximization alone does not fully explain the persistence of UFT. Here, PT also offers critical insights. Determinants like kinship relations emphasize that decisions are by expected utility as well as by how options are perceived relative to reference points. The empirical findings of this study revealed that UFT decisions were deeply embedded in loss aversion, kinship obligations, and emotional attachments to the homeland.

¹⁵ This study focuses solely on the determinants or explanatory factors highlighted by PT and RCT, rather than their measurement aspects particularly in the case of PT such as value functions.

Border communities framed their choices against reference points such as poverty, unemployment, and marginalization. Engaging in UFT was often seen as the only viable means of avoiding these losses. In this sense, participation in UFT reflected risk-seeking behavior in the face of economic precarity, as PT would predict. Moreover, kinship ties extending across the border, cultural bonds, and a strong sense of self-reliance provided a social framing that normalized UFT, despite its risks. PT therefore enriched the analysis by capturing these psychological, emotional, and relational aspects that RCT could not.

Taken together, the findings of this study suggest that RCT and PT are not competing but complementary theories in the context of UFT. RCT explains why individuals are economically drawn to UFT in contexts of weak institutions and high fuel costs, while PT accounts for why participation persists despite risks, rooted in perceptions of loss, social framing, and kinship obligations.

International Trade Theories moreover emphasize the persistence of cross-border flows of goods and people. Classical and modern trade theories (Smith, 1776; Ricardo, 1817; Heckscher & Ohlin, 1919, Melits, 2003) highlight how differences in resource endowments, costs, and comparative advantage drive trade across national boundaries. Applied to the Pakistan-Iran context, these theories explain why fuel moves across the border despite restrictions. Iran's subsidized energy prices and availability of oil resources create a structural incentive (as well as a comparative advantage) for surplus fuel to leak into Pakistan, where scarcity and higher costs prevail. The magnitude of this flow, 11 million liters of fuel per day, shows that UFT is an embedded part of the regional economy. Similarly, the trade provides income support to 79,800 individuals and show how the movement of goods across borders sustains local markets and entire communities.

6.7. On Validity and Generalizability of the Study

Adams (2007) states that validity and generalizability are central to assessing the overall quality of research, particularly in applied social and economic studies. Validity refers to the degree to which a study accurately measures what it intends to measure and whether its findings represent the phenomenon under investigation.

Generalizability concerns the extent to which the results of a particular study can be extended or applied to broader settings or contexts. Both concepts are fundamental in ensuring that research findings are sound, significant, and meaningful. Without validity, conclusions risk being

misleading or misinterpreted, and without generalizability, their practical value in shaping wider understanding remains limited.

In the context of this study, validity has been carefully ensured through methodological rigor and the triangulation of data sources, as stated in the methodology section. The research employed field surveys, focus group discussions, and key informant interviews across Pakistan. This combination of qualitative and quantitative evidence strengthens both construct and internal validity by allowing the findings to be verified across different forms of data and respondent categories. The consistency of patterns observed through traders' responses, administrative records, or field survey/observations, highlights measurement reliability and supports the authenticity of the conclusions drawn about the UFT dynamics in the study region.

As for generalizability, while the research is geographically focused on the Pak-Iran border, its insights are also, at least to some degree, generalizable to Pakistan. The determinants identified, ranging from price differentials and unemployment to weak regulation and dependency on informal income, are structural features of UFT and the border region as well as part of Pakistan's wider informal economy. Certain border-specific factors such as terrain, tribal linkages, and cross-border proximity are nonetheless unique to the region. The underlying economic incentives and governance failures driving UFT shows those determinants found in other informal or smuggling-based economic activities across the country.

As stated, the Cabinet Division (2020) states that hundreds of UFT outlets operate across Pakistan, confirming that this practice is limited confined to borderlands and represents a broader national phenomenon. Balochistan's overall oil demand is around 4 million liters per day. However, the per day UFT is 11 million liters. They reflect oil flow from outside Balochistan and a broader national phenomenon in which UFT fulfills Balochistan's own consumption needs and supplies a significant share of Pakistan's many informal fuel market, thereby validating the study's relevance to the wider Pakistan economy. Moreover, these bordering districts are the only source of the Iranian oil imports.

Therefore, while the findings may not be exactly generalizable to every province or every market, they hold somewhat conceptual and analytical generalizability. They capture how localized informal trade systems contribute to national-level distortions in energy markets and border governance. By maintaining methodological validity and interpretive consistency, this study offers credible and transferable insights into the socioeconomic and institutional dimensions of UFT in

Pakistan. Hence, even with its geographic focus, the research stands as a valid contribution to understanding Pakistan's undocumented economy.¹⁶

6.8. Conclusion and Recommendations

This study explored the issue of UFT in Pakistan Economy. Based on UFT case studies carried out around the globe, comprehensive surveys conducted along the Pak-Iran border from 2022 to 2024, extensive interviews carried out in the four provinces of Pakistan, FGDs and KIIs with experts & stakeholders, and the analysis of the UFT supply chain, this study highlighted the complex nature of UFT. The findings of this study underscore the social and economic significance of UFT due to its geographical remoteness from the main trade routes of Pakistan.

It highlights that a specific singular determinant does not govern UFT participation. Its drivers are rooted in a combination of financial and non-financial factors. Globally, only 70% of monetary purchases was among the several reasons motivating individuals to the unofficial markets while in developing countries the share was 30% (Williams & Bezeredi, 2017).

Likewise, this study finds that financial factors, as explained by utility theory, including the economic burden of high fuel prices in Pakistan, limited livelihood and employment opportunities, and the pursuit of economic stability, along with non-financial factors associated with prospect theory, such as kinship relations and emotional attachment to the homeland, collectively contribute to an environment in which UFT becomes a viable choice for individuals residing along the Pakistan-Iran border.

Among others, the critical determinants of UFT include the regions underdevelopment, characterized by inadequate infrastructure, limited access to education, and an absence of viable economic opportunities. The lack of a skilled labor force and the absence of industries or other employment-generating sectors exacerbates the situation. Insufficient agricultural development due to non-arable lands limits livelihood opportunities.

Additionally, attachment to the homeland and unwillingness to migrate to more developed regions of Pakistan perpetuate reliance on UFT. The unwillingness stems partly from the negligence of ground realities and a lack of awareness about opportunities to acquire skills in other provinces that could be used to contribute to the development of Balochistan and Pakistan. As a result, the region remains trapped in a cycle of underdevelopment and economic dependence on UFT.

¹⁶ These insights are based on Adams & Khan (2007) and Freedman (2028).

Moreover, border communities perceive participation in UFT as a symbol of self-reliance. Many believe that, as inhabitants of Balochistan, they have a right to utilize provincial resources, benefit from their geographical proximity to borders, and engage in activities (e.g. UFT) linked to these assets.

The findings further indicate that familial networks are critical in continuing UFT. Almost every Baloch family in border areas has at least one kinship tie extending into Iran. These relationships serve as a vital means of income and connect the Baloch people to their cultural roots, making UFT a cornerstone for economic survival and social cohesion in the border region.

Typically, it is assumed that the documented sector decreases if an undocumented sector increases (Yonous, 2024). However, different activities across boundaries are interconnected, possibly in mutually dependent or complementary ways, as shown in this study. Informal employment is central to the formal economic functioning of Balochistan. It is more useful to see such employment and the production and flow of goods within a spectrum of work that encompasses different levels of formality and informality.

Globally, multiple states allow the production and sale of illegal goods in some cases but not in others (Kashvraz, 2022). Goods may be legal according to law but illicit according to social norms (like alcohol). Likewise, some goods may be illegal however licit. That is to say, counter to state law but socially accepted. Such a situation describes border areas of Balochistan where UFT occurs, and undocumented goods are sold directly and openly without significant restrictions (as highlighted in this study). Examining the linkages between these different domains is vital.

It requires a long-term effort to fully formalize and document UFT and improve broader socioeconomic outcomes such as income growth, employment creation, and poverty alleviation in border towns while incentivizing people towards the formalization of UFT. An optimal strategy would encourage and incentivize a gradual shift from undocumented to documented trade on the one hand and stimulate economic growth on the other hand. Solving the UFT conundrum requires a gradual shift in policy that aligns with the realities of the local populace and acknowledges the intricate web of relationships that define the region by facilitating legal frameworks that empower individuals and communities. However, all this should be done based on the UFT details.

The literature suggests that reforms that are implemented without comprehensive consultation and stakeholder discussion end in suboptimal results. For better outcomes, data-driven interventions are required to align the goals of policymakers, businesses, and Baloch society, as well as reduce

regulatory uncertainty and uplift public trust. For this, Pakistan also needs to conduct a comprehensive review of existing UFT policies (such as Custom Act of 1969) to identify issues in regulatory measures as they are unable to solve the UFT conundrum. The country needs to develop regulatory policies that focus on promoting sustainable growth rather than solely maximizing fiscal and tariff revenues. The overall policy may be based on (among others) the livelihood of people. To fully harness the potential of the border regions policy practitioners may focus on transnational relationships and the socioeconomic dynamics at play, rather than strictly adhering to rigid legal definitions. Implementing measures to formalize UFT should boost economic growth as well as mitigate UFT related issues such as the black markets and corruption. Strengthening border markets and reducing regulatory burdens while maintaining strong ties with neighboring countries would be crucial in fostering inclusive growth.

Unemployment is a significant issue in Balochistan. This study argues that, currently, due to critical fiscal constraints, both the provincial and federal governments may not possibly be able to provide jobs to the individuals living in nearly half of Pakistan's geography (Balochistan accounts for nearly half of Pakistan's total area) and close the border at once (Muhammad, 2022), especially in a province with a one-seventh of the national population density.

To solve the UFT conundrum, the government may create sustainable job opportunities. Launch public-private partnership (PPP) initiatives to train and employ local youth in trade-related services. For this, the government may expand vocational training programs tailored to border communities, enabling residents to acquire skills for employment in emerging sectors like IT and enable individuals to find jobs in the rest of the provinces.

It may establish service-based enterprises like hospitality services at beaches and mountains of Gwadar and Balochistan. It would help in leveraging the proximity of the border for regional connectivity.

Going beyond legality definitions, the government may create formal border markets in border towns to regulate trade flows and provide a controlled environment for UFT. These markets should include integrated banking, warehousing, and soft customs facilitation services. Such trade facilitation measures and streamlined documentation may encourage local traders to transition to documented trade. Additionally, obtaining sanctions waivers could be pivotal in resolving international financial system-related challenges and allow for smoother cross-border trade. It would align local practices with international regulations.

It may support initiatives to diversify livelihood/employment options for border communities by promoting small-scale enterprises (in the short-run) in areas such as handicrafts, local food production, and value-added services. Develop a phased approach to formalize UFT, starting with pilot programs incentivizing traders to transition from undocumented to documented trade.

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