



War, Drugs, and Money: The Opium Trade in Afghanistan

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War, Drugs, and Money: The Opium Trade in Afghanistan

Edwin F. Snyder

A Thesis in the Field of International Relations
for the Degree of Master of Liberal Arts in Extension Studies

Harvard University

May 2019

Abstract

This thesis examines the various characteristics of Afghanistan's social institutions, local farmers, terrorist organizations, international institutions, and the global demand for opium and heroin. The principal focus is on the corrupt economic relations between international institutions and groups, and Afghanistan's domestic social structures and groups, with the aim of identifying winners and losers in the opium trade. By identifying patterns of corruption, new economic regulations may be developed to potentially limit corruption and the opium trade's complexity and adaptability within Afghanistan. By examining the resiliency of the opium trade, policymakers may discover elements within this illicit and complex adaptive economy that apply to licit economies, thus making them more resilient to external shocks.

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Chapter I

Overview of the Problem

Afghanistan historically has been a violent and unsettled country; some even define it as a borderland, a non-state, which makes it well suited to produce opium. In 1999 Afghanistan became the world's largest producer of opium poppies, producing 75% of the global supply of illicit opium, despite an ongoing civil war and political instability.¹ After 20 years of constant war, Afghanistan is still the world's largest producer of opium. Why is this?

One possible explanation is because the opium economy is a vast and complicated set of arrangements wherein agents—farmers, laborers, processors, brokers, warlords, traffickers, consumers—buy, sell, speculate, trade, oversee, create products, offer services, reinvest, strategize, explore, forecast, compete, learn, innovate, and adapt.² In economic terms, the opium market is a massively parallel system of concurrent behavior. Moreover, from all this synchronized behavior the market forms, prices form, trading positions appear, institutions and industries form. Complex patterns form. These complex patterns are cumulative and arise from individual actions, and individual deeds in turn adapt to these cumulative patterns creating a recursive loop.³ It is this recursive loop that

¹ UNODC, "Afghanistan Opium Survey, 2016," 4.

² W. Brian Arthur, "Complexity Economics: A Different Framework For Economic Thought," Chapter 1 in *Complexity and the Economy* (New York: Oxford University Press, 2014), 2.

³ Arthur, "Complexity Economics," 2.

connects resiliency with complexity. From this framework, the Afghan opium market can be qualitatively analyzed as a complex adaptive system (CAS) that resists outside pressures, allowing poppy production to thrive regardless of a highly dynamic, unstable, violent environment. Studies of complex systems in other disciplines provide models and analytical strategies for understanding ecosystems and economic structures.

I argue that by understanding the opium trade in Afghanistan as a complex system, and deconstructing its complexity from broad macro processes to the micro choice of agent within the market supply chain, policymakers may be able to develop advantageous regulatory initiatives in order to legalize and tax the illicit opium economy that is otherwise helping to fund the insurgency in Afghanistan and fuel the international opium market.

The question to be addressed is this: Why are illicit economies more resilient to external shock during times of conflict? My hypothesis is that the complexity of the opium market arises from the interaction of four factors:

1. historical processes of nations that use violence as a tool for social change,
2. ecological and geological settings in which the violence occurs,
3. socioeconomic choices of agents operating within that environment,
4. “utility” of the product used to create the market.

Through years of conflict, these mechanisms have adapted and become resistant to external shocks.

The resiliency of illicit markets arises from the interaction of nation-state social-control mechanisms, environmental factors, agents’ choice, and the utility of the product upon which that market is based. The opium trade includes mechanisms through years of

conflict; these mechanisms have adapted and become extremely resistant to external shocks. Moreover, the global market that supports the opium trade is composed of existing and potential customers who are addicted to the product or who exhibit high propensities to become addicted, and have the ability and willingness to acquire it and pay for it. The interaction of these factors and the vulnerability of the market to external shocks have allowed the market to increase in profitability and complexity over time.

By examining through the lens of complexity economics how the cycle of violence and corruption sustains the opium trade in Afghanistan, policymakers may discover elements within this illicit economy that apply to licit economies and make them more resilient to external shocks.

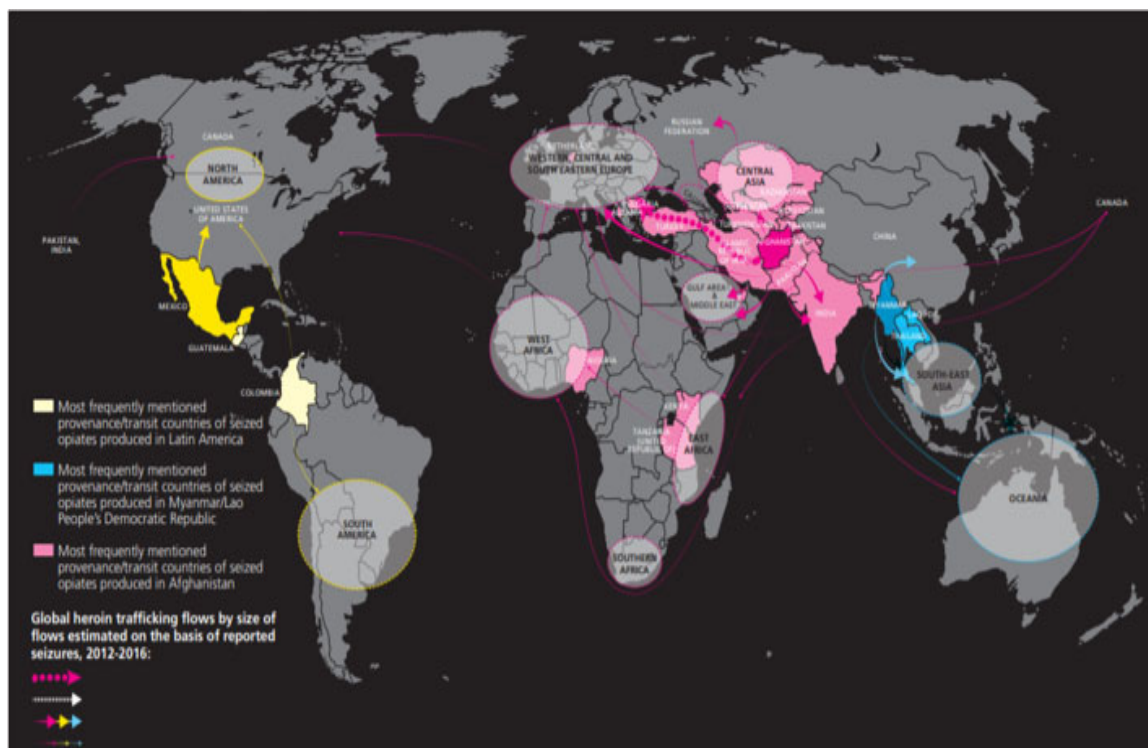


Figure 1. World Heroin Trafficking Flowsm 2012-2016.

Source: UNODC, Drug Report 2018.

Chapter II

Complex Adaptive Systems

A complex adaptive system (CAS) is a concept derived from complexity theory and the study of order, structure, and patterns arising from extremely complicated, apparently chaotic systems. Kevin Dooley states that a CAS evolves and/or behaves according to three principles:

1. Order is emergent as opposed to predetermined.
2. The system's history is irreversible.
3. The system's future is often unpredictable.⁴

This is how John Holland of the Santa Fe Institute defines a CAS:

A dynamic network of many agents (which may represent cells, species, individuals, firms, and nations) acting in parallel, constantly acting and reacting to what the other agents are doing. The control of a CAS tends to be highly dispersed and decentralized. If there is to be any coherent behavior in the system, it has to arise from competition and cooperation among the agents themselves. The overall behavior of the system is the result of a huge number of decisions made every moment by many individual agents.⁵

⁴ Kevin Dooley, "A nominal definition of complex adaptive systems," *Chaos Network* 8 (1996): 2-3.

⁵ John H. Holland, *Complexity: A Very Short History* (UK: Oxford University Press, 2014), 5.

Frans Osinga further defines a CAS, “as a nonlinear, interactive system that adapts to a changing environment. Such systems are characterized by self-organization and exist in a non-equilibrium state.”⁶

The self-organized patterns found in the complex ecosystem and economic landscape of the opium trade are determined by a feedback loop between the local populace, armed networks, and the economic parameters of the black market or illicit economy. This cause-and-effect relationship supports the link between insurgency, the economics of the opium trade, and how they interact to form a CAS. Examples of such systems include living organisms, the economy, stock market, corporations, societies, and the opium trade in Afghanistan.

In 1956, W. Ross Ashby, in the study of control systems, formalized what is known as the “law of requisite variety.” In short, that law sets the minimum number of behaviors or “variety” a system must have to survive and prosper in a given environment. As the number of distinct situations a system encounters increases, the variety of its behavioral repertoire must also increase in order to achieve desired outcomes; as Ashby put it: “variety destroys variety.” If a system has little variety or is overly constrained while being exposed to a large variety of stressors (i.e., a complex environment), it will sooner or later fail to achieve desired outcomes.⁷ Ashby’s law of requisite variety

⁶ Frans P.B. Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd* (Netherlands: Eburon Academic Publishers, 2005), 134.

⁷ W. Ross Ashby, “Requisite Variety and Its Implications for the Control of Complex Systems,” *Cybernetica* 1, no. 2, (1958): 2.

provides a scientific framework for understanding and analyzing a system's ability to survive and prosper in the face of external shocks.⁸

Accordingly, the opium trade has achieved a higher level of requisite variety allowing it to flourish in unstable economic and political environments. Requisite variety is defined as the larger the variety of actions available to a control system, the larger the variety of external shocks it can compensate.⁹ Note that in Figure 2 below, Panel (a) shows the system (right) being exposed to environmental disturbances (left). The variety of the environment is higher than the variety of the system, as there are four unique disturbances but only three unique responses. The system cannot respond to the green hexagon, which will disrupt it. Panel (b) shows a similar case, but where the system variety matches the variety of potential disturbances—the system has the requisite variety to respond to all potential disturbances. Systems with variety greater than that of their environment also possess requisite variety.

⁸ Joseph Norman, and Yaneer Bar-Yam, "Special Operations Forces: A Global Immune System?" (Cambridge: New England Complex Systems Institute, 2016): 2. Available from: https://www.researchgate.net/publication/301845678_Special_Operations_Forces_A_Global_Immune_System/citation/download.

⁹ Ashby, "Requisite Variety," 2.

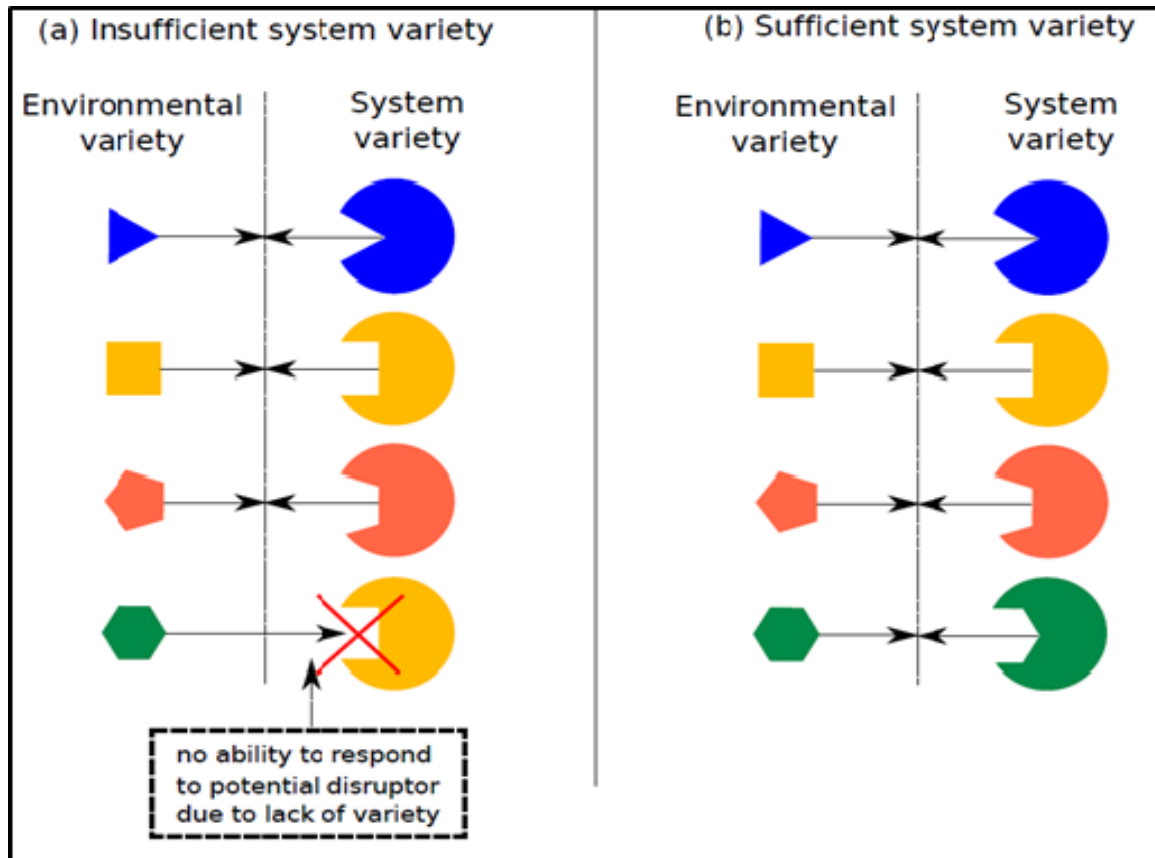


Figure 2. Requisite System Variety.

Source: Norman and Bar-Yam, 2016.

By analyzing the opium market via the law of requisite variety it can be argued, the mechanisms to respond to potential disturbances arise from participants acting within the market. The implication is that the participants in the system have learned to become dynamic, either working in parallel or independently across other social systems. This dynamic interaction allows participants within the market to cooperate or compete against cross-purposes, creating an adaptive structure that arises from circumstances that are ostensibly chaotic. In other words, by competing, adapting, and cooperating with the environment and socioeconomic systems, the opium market has learned to evolve and create a higher requisite variety.

While conventional economists are inclined to interpret markets in relation to their function in creating efficient resource allocation, the opium market operates in a far more complex manner. It also performs a wide range of other tasks critical to the processes of production and development.¹⁰

In the neoclassical economics literature, the “market” is understood as an autonomous and flexible mechanism of voluntary exchange based on choice, a mechanism by which prices are formed as a result of supply and demand, and through which scarce resources are valued and allocated, as depicted in Figure 3. When markets are defined in this way, the question of efficiency is reduced to how competitive that market is and the extent to which it conforms to the neoclassical ideal of competition.¹¹ This efficiency is based on market integration in which prices are assumed to be determined interdependently. Meaning, whether the prices of a commodity in spatially divided markets synchronize and price signals are transmitted efficiently through them. As a result, consumer preferences transfer without distortion to producers who will use this price information to make efficient production decisions.¹²

¹⁰ Barbara Harriss-White, “The Three Roles of Agricultural Markets: A Review of Ideas About Agricultural Commodity Markets in India,” *Economic and Political Weekly* 47, no. 52 (2012): 42.

¹¹ Harriss –White, “Three Roles,” 40.

¹² Harriss-White, “Three Roles,” 46.

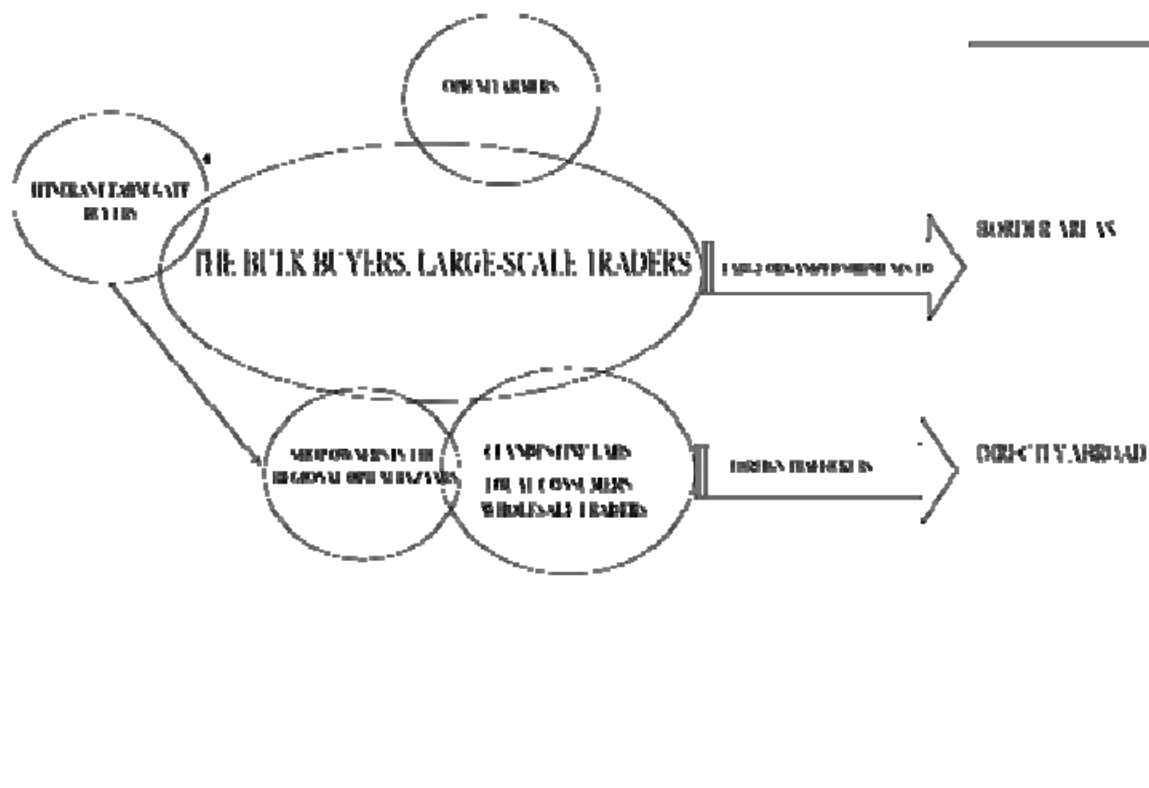


Figure 3. Neoclassical Afghanistan Opium Market Model.

Note: The neoclassical market model isolates the market into a closed system that is not affected by the larger social structure, environment, and structures. The opium market cannot be analyzed in isolation – because it is part of a larger hierarchy of socio-economic relations.

Source: Rand Corp.

The opium market is heterogeneous, internally differentiated, and maintains efficiency. Simultaneously, the price of opium is influenced by agent information exchanges within the market. These exchanges range from farmers paying taxes to the local Taliban as shadow governor, to international traffickers trading for crypto-currency on the dark-net, to military commanders maneuvering forces across their battle spaces. Ultimately these actions form the complexity of the opium market as illustrated in Figure 4. An adaptive socioeconomic system utilizes the arena of conflict as an opportunity to transform risk into efficient exchanges that learn over time to adapt to the unstable

environment and threat of external intervention to become a resilient platform for information exchange.

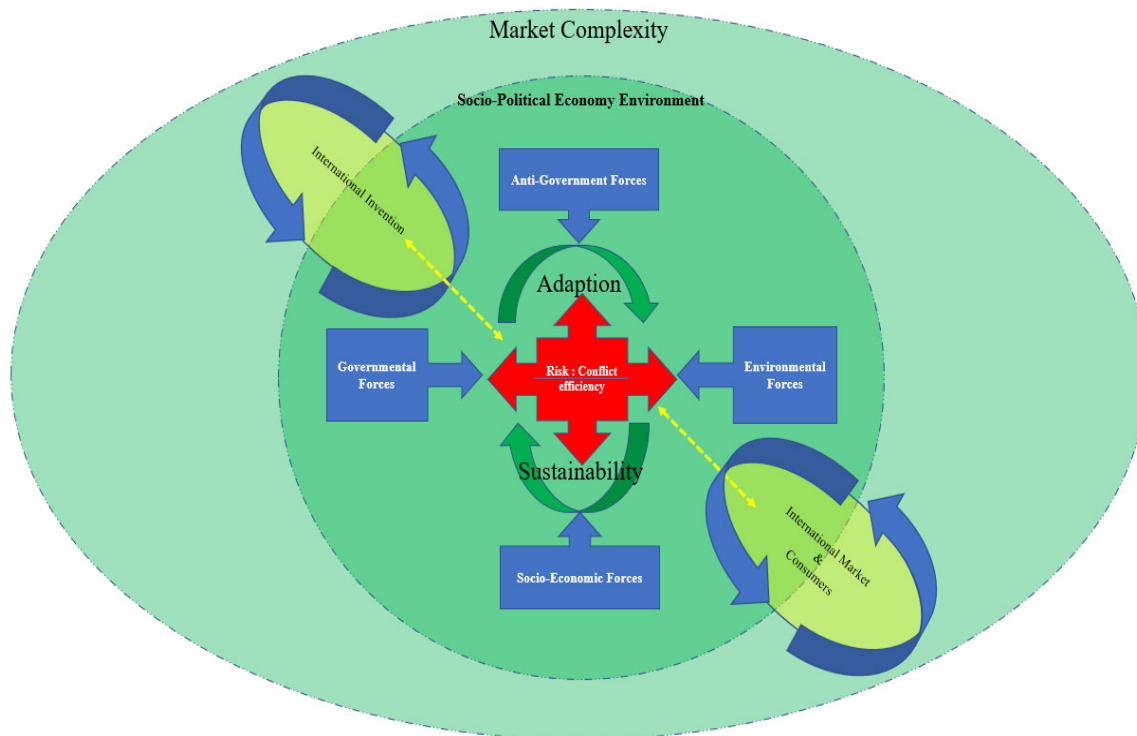


Figure 4. Patterns of Market Complexity.

Source: thesis author.

Socioeconomic scholarship attempts to define these information exchanges as categories of social action.¹³ Here, markets are understood as “socially constructed arenas where repeated exchanges occur between buyers and sellers under a set of formal rules

¹³ Igor Matutinovic, “Economic Complexity and the Role of Markets,” *Journal of Economic Issues* 44 no. 1 (2010): 31.

and informal understandings that govern relations among competitors, suppliers, and customers.”¹⁴

As an abstract theory, the concept of a complex market should be understood as an assembly or a series of information exchanges occurring on multiple levels arising out of knowledge, skills, and technologies, socially constructed from the agents’ desires. For example, in different countries at different times markets will vary in pricing practices and competition depending on local legal circumstances, cultural understandings, and technology. Moreover, some markets are higher in “marketness” than others. The degree of “marketness” is observed in the relative importance of the price consideration compared to social concerns like status and friendship.¹⁵

When compared to legal markets, the opium market is high on marketness and high on status and friendship. The constant threat of legal/military intervention implies there are critical decision points based on trust and risk, such as how to evade detection and apprehension. Once those decisions occur, the very next decision is how to maximize profit—and sometimes risk will direct to maximize profit above everything. The environment of war surrounds every social context and information exchange throughout the nation, making it one of the central elements driving the opium market’s resiliency and complexity.

¹⁴ Neil Fligstein, and Cyrus Dioun, “Economic Sociology,” Chapter 7, in *International Encyclopedia of the Social & Behavioral Sciences*, 2nd edition, edited by James D. Wright (Oxford: Elsevier Press, 2015), 67. Available from: <https://sociology.berkeley.edu/sites/default/files/faculty/fligstein/Economic%20Sociology.pdf>.

¹⁵ Fligstein and Dioun, “Economic Sociology,” 67.

Chapter III

Brief History of Opium Production in Afghanistan

Complexity is about formation and the formation of structures.¹⁶ To gain an understanding of the opium market in Afghanistan, a brief historical exploration of opium production in Afghanistan's neighboring countries is needed.

In the 1970s, Turkey was the largest producer of opium in the world, growing about 80% of the global total. In that same decade, U.S. President Richard Nixon persuaded Turkish leaders to begin an opium eradication program. However, this program in fact became the impetus for Turkey to legalize opium production. In 1974, Turkey began to issue licenses to local poppy farmers to produce opium legally. Today, Turkey generates \$60 million a year exporting the raw materials for medical morphine and codeine throughout the world.

In 1979, the Islamic revolution in Iran led to the overthrow of Shah Reza Pahlavi's government. "After the revolution in 1979, Iran, which had cultivated drugs for years, managed to eradicate growing of opium poppies in a year and a half," said Antonio Mazzitelli, the Iranian representative of the UN Drug Control Programme (UNDCP).¹⁷ Today, Iran has the highest drug addiction rate per capita in the world. Not surprisingly, the effect of the poppy legalization program in Turkey and the ban on opium production

¹⁶ Arthur, "Complexity Economics," 3.

¹⁷ Cédric Gouverneur, "The Heroin Route From Afghanistan to Europe: Iran Loses Its Drugs War," *Le Monde Diplomatique*, March 2002. Available from: <http://mondediplo.com/2002/03/13drug>.

in Iran pushed the opium trade into Afghanistan. In that same year, during the revolution in Iran, the Soviet Union invaded Afghanistan. It was at this point that *mujahedeen* rebels, fighting against the Soviets, began using opium to raise cash to buy weapons from Pakistan.

These geopolitical events acted as catalysts for Afghanistan's share of the world opium production, increasing from 20% in 1980 to 50% in 1995. Soviet forces pulled out of Afghanistan in 1995, and the country fell into civil war. The radical Sunni Islamic group, the Taliban, with support from elements in the Pakistani intelligence service ISI, took over in 1995. By 1996, Afghanistan was producing 120 metric tons (MT) of opium, and by 1999, it generated 79% of global opium. One reason for this increase was the financial management provided by Osama bin Laden. In August 1998, the *Washington Post* said that the Taliban was taking advantage of Bin Laden's talents as a financial advisor and manager by having him handle their "multi-billion-dollar opium earnings." A month later, *Al-Eatan Al-Arabi*, following the *Post*'s lead, reported that "Bin Laden administers the funds of this movement [Taliban] estimated at \$8 billion."¹⁸

The illicit opium economy in Afghanistan is part of the broader international opium market that evolved from a set of predominantly regional, legal markets for opium and its derivatives centered on Asia to a broad geographic market.¹⁹ Specifically, the international heroin market grew, ebbed, reemerged, and transformed itself in response to changing social perspectives on opiate use, technologies, economic and political

¹⁸ Stephen Tanner, *Afghanistan: A Military History from Alexander the Great to the Fall of the Taliban* (Cambridge, MA: Da Capo Press, 2002), 227.

¹⁹ Letizia Paoli, Victoria A. Greenfield, and Peter Reuter, *The World Heroin Market* (New York: Oxford Press, 2009), 15.

development, and in part to the evolution of international and national control regimes.²⁰ In Afghanistan, current control measures, such as eradication and crop replacement, have perverse consequences, serving instead to increase the intensity of the armed conflict which benefits those with a vested interest in the continuation of the war in Afghanistan and the opium trade.

A common misunderstanding of why there is a prevalence of illicit substance manufacturing in conflict zones is centered on drugs-for-arms strategies. This narrative begins with the centralized power within rebel groups or governments, where warlords oversee the growth of illegal substances to finance their military campaigns.²¹ However, as Lind, Moene, and Willumsen, argue in their paper “Opium for the Masses? Conflict-Induced Narcotics Production in Afghanistan”, there is a reverse mechanism occurring, especially within conflict-induced narcotics production. This mechanism resides within fragmented power structures where local producers and manufacturers react to conflict by raising drug production. This happens not because they want to reserve cash to buy arms but because production decisions reflect an innovative social and economic order that operates within a compressed time horizon created by conflict.²² In the case of Afghanistan, the key is understanding that opium cultivation requires a minimum investment and provides maximum economic turnover in a short amount of time.²³ These

²⁰ Paoli, Greenfield, and Reuter, “World Heroin Market,” 15.

²¹ Jo Lind, Karl Moene, and Fredrik Willumsen, “Opium for the Masses? Conflict-Induced Narcotics Production in Afghanistan,” CESIFO Working Paper No. 2573 Category 2: Public Choice (March 2009): 3.

²² Jo Lind, Karl Moene, and Fredrik Willumsen, “Opium for the Masses? Conflict-Induced Narcotics Production in Afghanistan,” *Review of Economics and Statistics* 96, 5 (2014): 4.

²³ Lind, Moene, Willumsen, “Opium for the Masses,” 2009: 4.

are key factors in the political uncertainty produced by war. War is an environment-altering process effecting everything from ecology and inter-personal relationships to the institutional structures of society. Opium production is only one entry point into a process that links cultivation to distribution networks, and the creation of wealth to new assemblies of authority. Therein lies another crucial function of opium economies: the opium market's ability to normalize social exchange in conflict, adding wholeness to the otherwise fragmented and violent lives of those who benefit from the trade.

The opium market has flourished in Afghanistan because war breaks down economic and social order creating space for the emergence of alternative systems of profit, power, and protection.²⁴ Insecurity and unpredictability, coupled with the weakening of law and order, bring about a more opportunistic society: increased criminality; the disruption of licit markets, and opportunities for what Collier calls "rent-seeking predation."²⁵ While this is immensely detrimental for society at large, it provides opportunities for armed groups to benefit economically from alternative, illicit economies.²⁶

In 1978, a Soviet-backed Communist coup known as the Saur Revolution, occurred in Afghanistan when then-King Zahir Shah was deposed by his cousin Mohammed Daud Khan. In reaction, tribes in rural areas rose up against the coup, soon leading to the Soviet invasion. Throughout the Soviet occupation of Afghanistan between

²⁴ Paul Collier, "Doing Well Out of War: An Economic Perspective," World Bank Paper prepared for the Conference on Economic Agendas in Civil Wars, London, 1999: 6.

²⁵ Collier, "Doing Well Out of War," 9.

²⁶ Svante E. Cornell, "The Interaction of Narcotics and Conflict," *Journal of Peace Research* 42, no. 6 (2005): 752.

1979 and 1989, the average annual growth of opium production was 14%. When the Soviet Union finally withdrew from Afghanistan in 1989, the country fragmented and fell into lawlessness, causing a 19% increase in opium production between 1989 and 1994. From the chaos that developed after the Soviet withdrawal, the Taliban seized power in 1994 and took control of 90% of the country.

Thereafter, opium production increased, as author Jonathan Goodhand points out. In Kandahar in 1996, production increased to 120 MT from 79 MT the previous year. during the 1997-1978 timeframe, total output for Afghanistan was 2,700 MT—a 43% increase over the previous year. Poppy cultivation also began to spread to new areas in the north and northeast, including territories outside Taliban control. By 1999, production reached its peak of 4,500 MT, representing 75% of the world supply. In 2014, the total area under opium poppy cultivation in Afghanistan was estimated at 224,000 hectares, a 7% increase from the previous year. The vast majority (89%) of opium cultivation took place in nine provinces in Afghanistan’s southern and western regions—also the country’s most insecure provinces. Helmand province remained Afghanistan’s major opium-cultivating region, followed by Kandahar, Farah, and Nangarhar provinces.

Opium cultivation increased in most of the central poppy-cultivating provinces but remained stable in Helmand (+3%)²⁷; different trends also were observed there. Inside the former “Food Zone” (an alternative livelihood program), opium cultivation increased by 13% in 2014 (to 41,089 hectares from 36,244 hectares in 2013). What caused this increase? One possibility is that the alternative livelihood program increased

²⁷ All figures taken from UNODC, “Afghanistan Opium Survey 2014,” 1–67.

the soil quality as the result of international development. Many times these alternative crops were used by farmers to hide opium plants within the fields.

Conversely, outside the Food Zone, where increases in poppy cultivation seen in previous years were mainly achieved through artificial irrigation, the area under poppy cultivation decreased slightly. According to UN data, eradication of opium poppies decreased by 63% in 2014 to 2,692 hectares. Average opium yield amounted to 28.7 kilograms per hectare in 2014, which was 9% more than in 2013 (26.3 kilograms per hectare).

Opium yields in the southern region (which drives overall production) increased by 27%, from 23.2 kilograms per hectare in 2013 to 29.5 kilograms per hectare in 2014. However, these yields were still at relatively low levels compared to levels before 2010. Potential opium production was estimated at 6,400 MT in 2014, an increase of 17% from its 2013 level (5,500 tons). This increase is attributed to a sharp increase in production in the southern region, where yields increased by 27% (from 23.2 kilograms per hectare in 2013 to 29.5 kilograms per hectare in 2014). Accounting for 69% of national production, the southern region continued to produce the majority of opium in Afghanistan. With 16% of the total, the western region was the country's second most crucial opium-producing region in 2014, with approximately US\$0.85 billion or roughly 4% of Afghanistan's estimated GDP.

The farm-gate value of opium production decreased by 13% in 2014. In 2017, opium poppy cultivation increased sharply to an unprecedented record high of 328,000 hectares from an estimated 201,000 hectares in 2016. Between 2016 and 2017, the area under cultivation with opium poppy increased by 127,000 hectares – the increase alone

exceeded annual cultivation levels in 2009 and 2010. Opium poppy cultivation increased strongly in almost all major poppy cultivating provinces. In Helmand province alone, cultivation increased by 63,700 hectares (+79%) which accounted for about half of the total national increase between 2016 and 2017. Substantial increases were also observed in Balkh (+10,000 hectares or almost five times more than in 2016), Kandahar (+7,500 hectares or +37 percent), Nimroz (+6,200 hectares or +116 percent), and Uruzgan (+6,000 hectares or +39 percent).²⁸ Figure 5 illustrates the growth in poppy production. Just as opium production increased when Soviet troops withdrew from the country, the same trend is occurring today (2019), indicating a correlation between troop reduction and increased opium production.

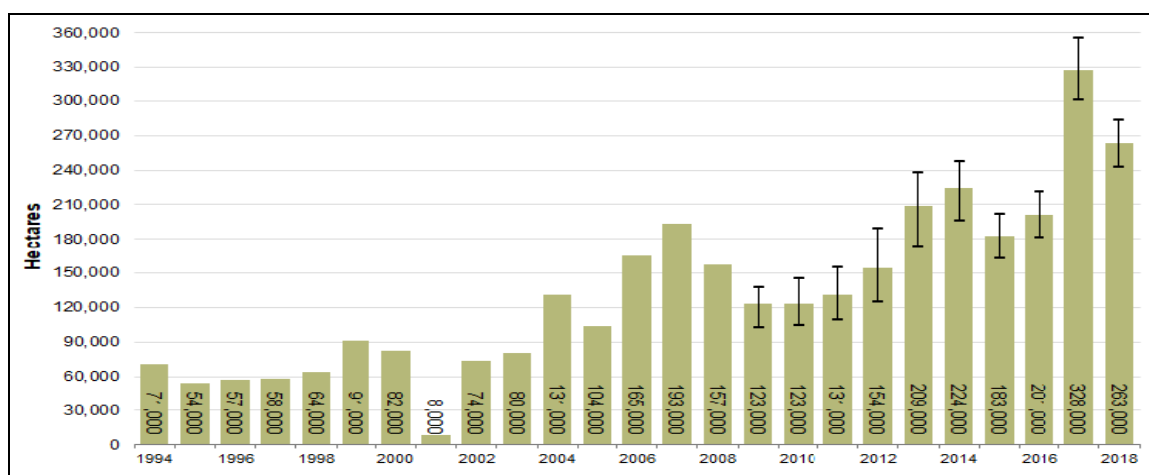


Figure 5. Opium Poppy Production in Afghanistan, 1994-2018 (hectares).

Source: MCN/UNODC (2018), UNODC opium surveys 1994-2018.

²⁸ UNODC, “Afghanistan opium survey 2017: Challenges to sustainable development, peace and security” (May 2018): 4.

Empirical analysis indicates that where a pre-existing drug production exists, the conditions of armed conflict boost narcotics production, and insurgents become involved in the drug trade to finance their struggle, thereby increasing their capabilities as well as the challenges they pose to states where the war is occurring. James A. Piazza recently conducted an empirical analysis of the opium trade and patterns of terrorism in Afghanistan. His analysis revealed that high opium production provinces—those with annual hectares of poppy cultivation over the median—experienced 3.1 terrorist attacks per year and experienced 20 terrorism casualties; low opium-producing provinces averaged 2.5 terrorist attacks and 13 terrorism casualties annually.²⁹

Table 1. Annual Opium Production and Terrorism in Afghan provinces, 1994–2008.

Province	Avg. annual opium production (hectares)	Production compared to average (high or low)	Avg. annual terrorist attacks	Avg. annual terrorist casualties
Helmand	42,400	High	9.6	58.2
Nangahrar	14,230	High	3.8	25.8
Kandahar	7,367	High	16.4	122.6
Badakhshan	5,951	High	2.4	17.4

Source: Adapted from Piazza, 213.

Piazza's analysis highlighted an important finding: poppy cultivation brings about significant costs to the licit economy by creating and maintaining an economic cycle that relies on insecurity and corruption. This cycle discourages investment in the economy

²⁹ James A. Piazza, "The Opium Trade and Patterns of Terrorism in the Provinces of Afghanistan: An Empirical Analysis," *Terrorism and Political Violence* 24, no. 2 (2012): 213.

because a decrease in security affects the value of wage labor, currency stability, and indebtedness. Thus, when poppy production increases, armed groups acquire the profits, then use the money to prevent the government and international community from disrupting the group's illicit enterprise by launching attacks and bribing government officials.

Opium production also creates a debt cycle among poor farmers who are obliged to take on debts year after year. A government study found: "Some farmers take out loans to cultivate large amounts of opium 2007 US poppy, creating a vicious cycle of debt that cannot be broken by shifting back to illicit crops."³⁰ Specifically, a farmer takes out a loan in one year to grow poppies for the next year. But some farmers are never able to pay back the loans, and in essence become indentured servants. Furthermore, an increase in poppy production causes decreased security because an economic interdependence exists between the farmers who need wages and the armed groups' need for profits to purchase more weapons, pay their fighters, and pay off governments officials. In 2016, Afghanistan set a new record for opium production, despite an US\$8.5 billion counter-narcotics campaign investment by U.S. agencies, indicating that a troubling link exists between an increase in poppy production and a decrease in security.

In some cases, involvement in the drug trade also seems to affect the structure of insurgent groups, creating vested interests in continuing armed conflict.³¹ For example, the driving forces inside Afghanistan's opium supply chain are the warlords, their

³⁰ Christopher M. Blanchard. "CRS Report for Congress: Afghanistan—Narcotics and U.S. Policy," CRS: 25-26. Available from: <http://fas.org/sgp/crs/row/RL32686.pdf>.

³¹ Cornell, "Interaction of Narcotics and Conflict," 751.

commanders, and combatants who require profits to maintain their armed struggle. The farmers are often compelled to cultivate poppies but receive only a nominal share of the profits. Nevertheless, poppies are a valuable cash crop that offers about ten times higher return than wheat crops.³²

From a commodity and supply-chain approach, other actors such as state authorities and international agencies are part of the sociopolitical environment that affects production and marketing as a result of policy choices.³³ The supply chain extends from farms to international markets, providing working capital financing at all stages. Current research indicates there are critical economic factors influencing actors' decisions to enter the opium market in Afghanistan: The ready availability of consumer markets and high net returns from production promise high incomes, and opium-denominated debt allows farmers to hedge their price risk.³⁴

³² Cornell, "Interaction of Narcotics and Conflict," 751.

³³ Hermann Kreutzmann, "Afghanistan and the Opium World Market: Poppy Production and Trade," *Iranian Studies* 40, no. 5 (2007): 609.

³⁴ Kreutzmann, "Afghanistan and the Opium World Market," 609.

Chapter IV

Market Complexities and Opium Pricing

Evidence of market complexity arises from fluctuations of opium farm-gate prices versus heroin prices on the international market. The farm-gate value of opium (see Figure 6) is a central measurement because it identifies income generated from the cultivation and harvest of opium in rural areas.

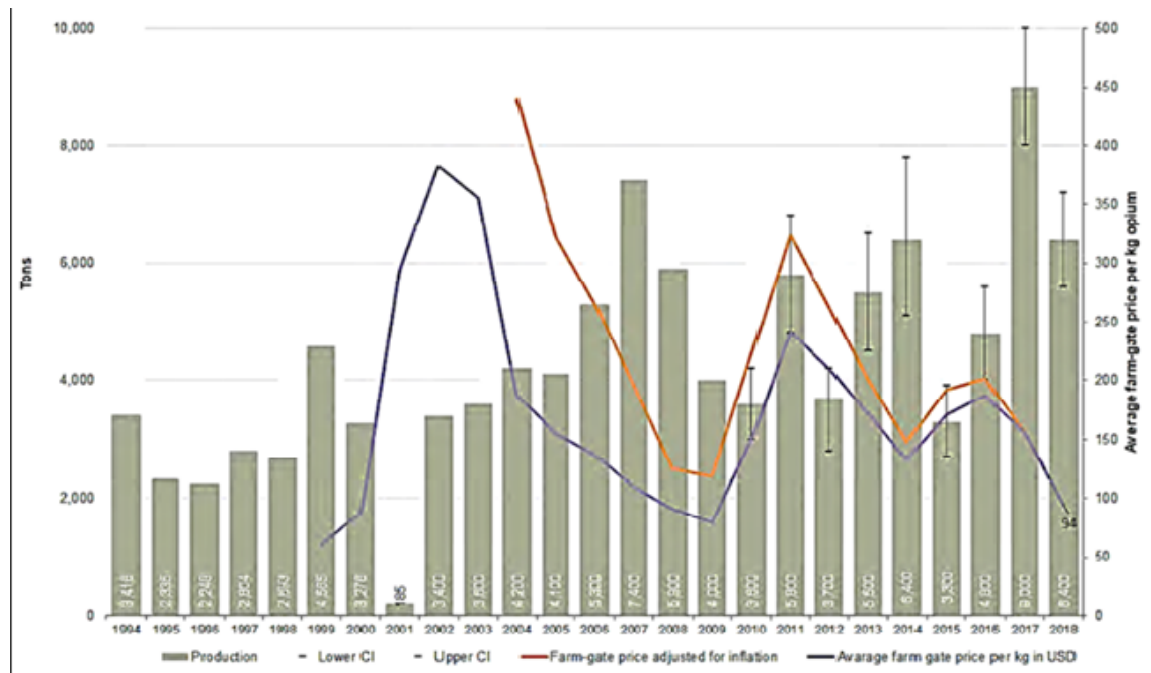


Figure 6. Farm-gate Prices of Dry Opium at Harvest Time Weighted by Production.

Source: UNODC, Afghanistan Opium Survey 2018, 30.

Opium prices at the farm-gate encounter strong seasonal fluctuations, varying substantially in reaction to the supply of opium on the market. In 2018, the average regional farm-gate prices at harvest time decreased in all regions of Afghanistan except the northeast, where prices increased before harvest and began to decrease only in the months following harvest. Continuously decreasing prices indicate opium saturation in the world market.

The estimated farm-gate value of opium production in 2018 decreased by 56% from 2017 level, amounting to US\$604 million. The decrease in farm-gate value was likely due to a combination of reduced opium poppy cultivation and production, and declining opium prices in reaction to previous year's record harvest. Farmers in Helmand, the country's largest opium-producing province, earned an estimated US\$288 million—equivalent to 48% of the total farm-gate value of opium production in Afghanistan in 2018, and a decrease of 51% from 2017 (US\$584 million) (see Table 2). This significant reduction in income was caused mainly by a 44% decrease in farm-gate prices in the southern region.

Although the farm-gate price of opium declined compared to the previous year, high levels of cultivation and production continued to exceed demand from the international market, subsequently decreasing prices for heroin on the global market.³⁵ However, evidence suggests that the local economy in Afghanistan still benefits even when farm-gate values decline. For example, despite depressed farm-gate prices in 2018,

³⁵ UNODC, "Afghanistan Opium Survey 2018," 30.

Afghan farmers earned a combined US\$1.4 billion at the farm-gate, corresponding to roughly 7% of GDP or about 30% of the value of licit agricultural sector of the country.

Table 2. Regional Farm-Gate Prices of Dry Opium at Harvest Time, 2016-2018.

Region	Average Dry Opium Price (US\$/kg) 2017	Average Dry Opium Price (US\$/kg) 2018	% Change 2017-2018
Central	NA	NA	NA
Eastern	184	107	-42%
North-eastern	63	70	12%
Northern	82	56	-31%
Southern	155	87	-44%
Western	241	165	-32%
National average weighted by production*	155	94	-39%

Source: UNODC, “Afghanistan Opium Survey 2018.”

Each year thousands of tons of opium are produced in Afghanistan and then converted into heroin to reach end-consumer markets around the globe. With record high production in 2017, a wave of high-quality, low-cost heroin reached the international market.³⁶ This low-cost heroin saturated the global market causing opium and farm-gate prices to drop in 2018.

³⁶ UNODC, “Afghanistan Opium Survey 2017,” 4.

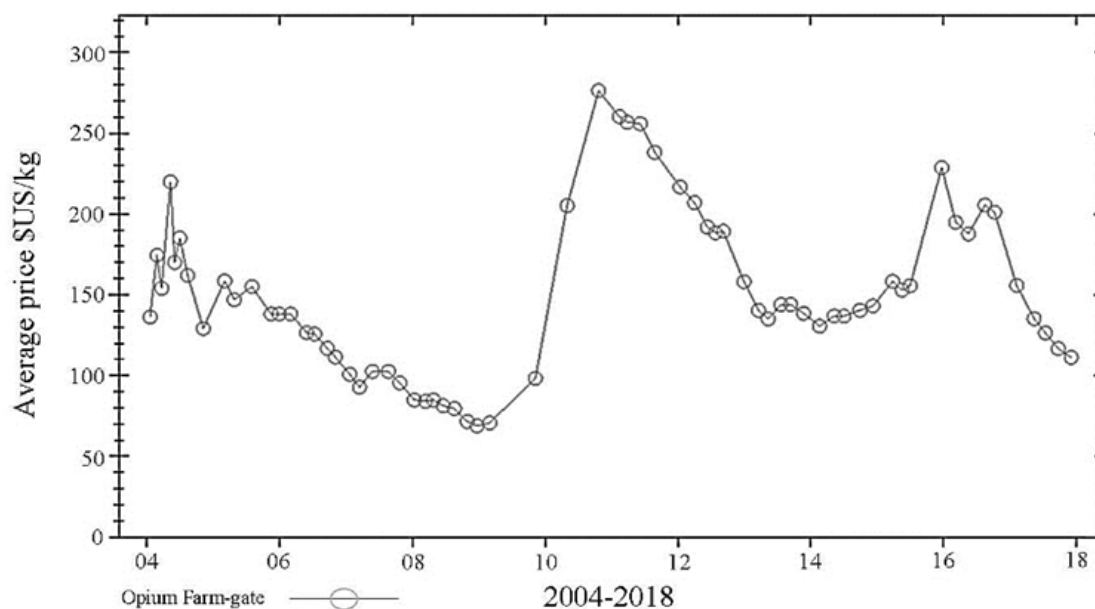


Figure 7. Opium Farm-Gate Pricing, 2004–2018.

Source: Adapted from UNODC surveys, 2004–2018.

A 2018 study conducted at the University of Heidelberg found that local opium farm-gate prices at harvest time in Afghanistan are likely driven by opium supply-side effects in Afghanistan.³⁷ Additionally, variations in the international heroin price result from fluctuating supply and demand in the international market and in Afghanistan (see Figure 8).³⁸

³⁷ Kai Gehring, Sarah Langlotz, and Stefan Kienberger, “Stimulant or Depressant? Resource-related Income Shocks and Conflict” (Germany: University of Heidelberg, 2018): 20.

³⁸ Gehring, et al., “Stimulant or Depressant?”, 21.

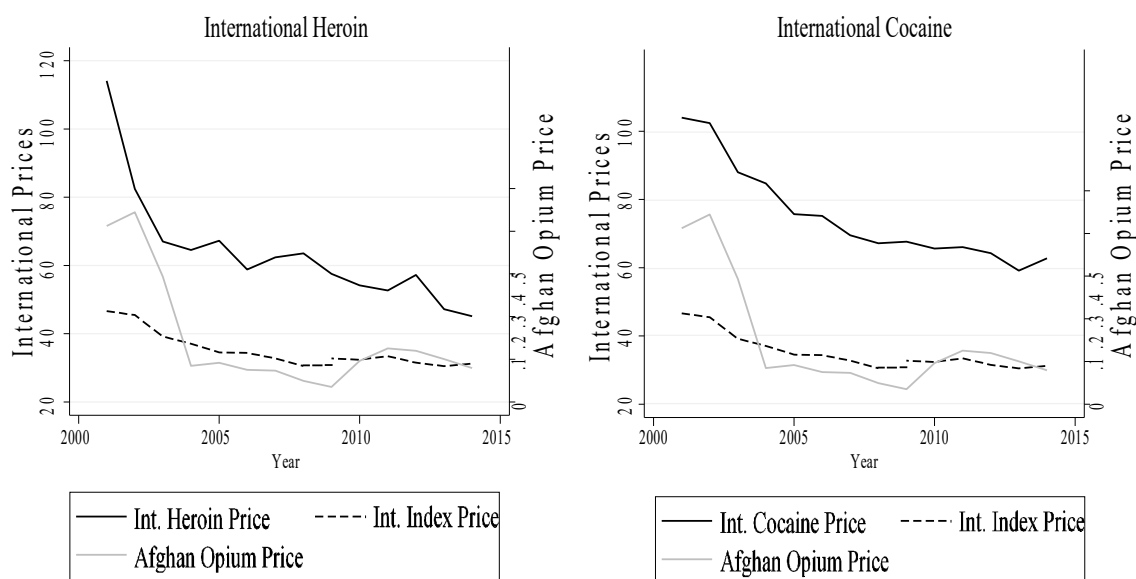


Figure 8. Drug Price Variations

Source: Gehring, et al., 2018.

Although there are variations between years, overall the variations decline over time. The reciprocated pattern proposes that on average the development of prices over time is more strongly driven by common demand factors and not by shock to an individual drug.³⁹ Because there is an overall positive correlation between the international heroin price, the complement index, and the cocaine price, confirming the cross-price elasticity of local Afghan opium prices correlates positively with the international heroin price.

³⁹ Gehring, et al., “Stimulant or Depressant?”, 21.

I compared heroin price per gram in Germany and in Afghanistan over a three-year period and found a significant increase in the price of heroin outside of Afghanistan. This indicates that despite end-customer market prices being magnitudes higher than local prices, international price changes also translate into economically meaningful changes in the country of origin.

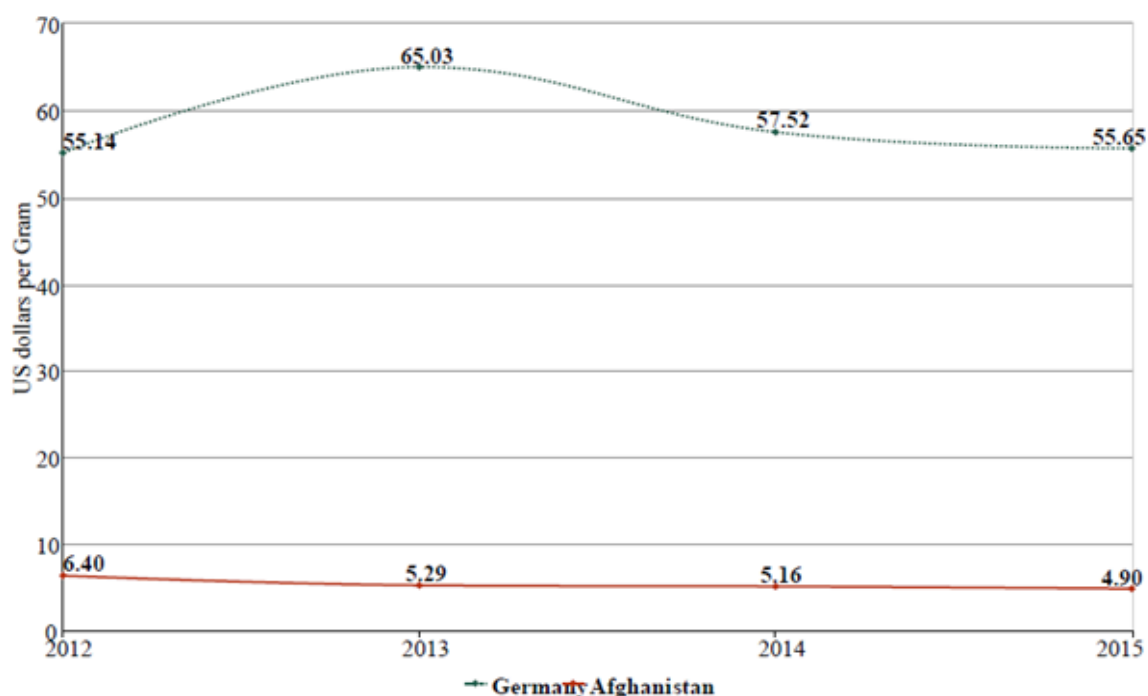


Figure 9. Afghan Opium Price vs. German Heroin Price.

Source: created by thesis author using UNODC Datasets 2012-2015, via www.Knoema.com database.

When these indicators were analyzed in more detail, an indirect result embedded in these models revealed that interactions among individuals can result in global outcomes, in this case heroin prices and opium trades that were not part of one specific transaction. This means that as they move along the supply chain, opium products

significantly increase in price, i.e., lower at farms in Afghanistan, increasing in consumer markets in Europe and Asia where wholesale and retail prices are considerably higher—but Afghan farms still benefited and continued production at record levels. There are sufficient returns at each stage of the supply chain and, despite (or because of) Afghanistan’s fractured infrastructure, there is a well-linked market for credit, purchase, transport, and processing.⁴⁰

Some estimates suggest that for every hectare of opium poppies cultivated, as many as 5.6 jobs are created in the rural non-farm economy.⁴¹ Interestingly, it is the Afghan farmer and his comparative advantage that helps explain why Afghanistan has become the world’s premier opium supplier. In earlier years of poppy production in Afghanistan, the availability of qualified labor was a limiting factor. The task of lancing poppies requires experience and knowledge and without such skilled workers, it can have a significant impact on production. During the 1990s, a vast pool of competent workers emerged, giving Afghanistan a comparative advantage relative to other actual and potential producers.⁴²

⁴⁰ David Mansfield, and Adam Pain, “Alternative Livelihoods: Substance or Slogan?” Afghanistan Research and Evaluation Unit, 2005: 3.

⁴¹ John W. Mellor, “Poppies, and Agriculture Development in Afghanistan” (USAID/RAMP Project, 2005): 10.

⁴² International Monetary Fund (IMF), “Rebuilding a Macroeconomic Framework for Reconstruction and Growth, in “The Poppy Dimension in the Afghan Economy,” in Annex II.1 (2003): 7.

Chapter V

Poppy Farming: Process, Risks, and Rewards

Afghan farmers grow poppies because of the comparative advantages that crop offers: first, it is a low-risk crop in a high-risk environment, and second it provides access to land and credit.⁴³ Afghanistan's cultivation of other crops is limited because crops such as fruit and wheat are vulnerable to crop failure as a result of water shortages and an inability to reap the full value due to poor transportation in some areas. Growing poppies solves this dilemma: no other crop offers relative resistance to drought, is non-perishable, has an almost guaranteed market, and traders offer advance payments against future crops.⁴⁴

The profitability of poppies is determined by the resources of those involved in its cultivation, that is, those with land, water, and credit can profit whereas those with few assets merely survive. That said, in many places poppy cultivation is a way for those with few assets to access land and employment. In Afghanistan, the primary way for resource-poor farmers to access land is through sharecropping. Poppy cultivation gives sharecroppers access to land on which they can produce food crops. They can also gain access to credit through the *salaam* system, which involves an advance payment against a

⁴³ Jonathan Goodhand, "Frontiers and Wars: A Study of the Opium Economy in Afghanistan," *Crisis States* (January 2003), 207. Available from: <http://www.crisisstates.com/download/others/SeminarJG29012003.pdf>.

⁴⁴ UNODC, "Afghanistan's Drug Industry: Structure, Functioning, Dynamics, and Implications for Counter-Narcotics Policy (2006): 60. Available from: <https://reliefweb.int/report/afghanistan/afghanistans-drug-industry-structure-functioning-dynamics-and-implications>.

fixed amount of agricultural produce—and opium is the favored crop of money lenders.⁴⁵ This system, in turn, helps to expand opium production in Afghanistan because it gives access to land and employment for resource-poor farmers. Poppy cultivation offers stability to many groups within Afghanistan because, in the absence of government or state controls, the opium trade offers solidarity at the local level because people depend on the trade as a means of survival, providing the Afghan poor with a greater chance at upward mobility.

Historically, Afghanistan's local farmers have developed unofficial power structures to shield themselves from the state rather than participate in it, and this has caused the opium trade to flourish in Afghanistan. The disintegration of the state opened such illicit possibilities that the opium trade today has become ingrained in the fabric of Afghan society and now offers more social stability than the government.

An explanation of the complexity and resiliency of the opium market supply-chain and its path to international markets is needed. A supply chain is commonly defined as the range of goods and services necessary for an agricultural product to move from the farm to the final customer or consumer.⁴⁶ It encompasses the provision of inputs, actual on-farm production, post-harvest storage and processing, marketing, transportation, and wholesale and retail sales.” A multi-channel supply chain is an entity comprised of many elements (constituent parts) with paths (lines of communication or

⁴⁵ Goodhand, “Frontiers and Wars,” 207.

⁴⁶ Special Inspector General for Afghanistan Reconstruction (SIGAR), Quarterly Report to the United States Congress, 30 October 2018: 206. Available from: <https://www.sigar.mil/quarterlyreports/.206>.

activity) between them,⁴⁷ and these “constituent parts” can be individuals or organizations that are involved in opium distribution. A multi-network supply chain of stocks flows with opium moving along routes beginning with the production cycle and ending at distribution (see Figure 10).

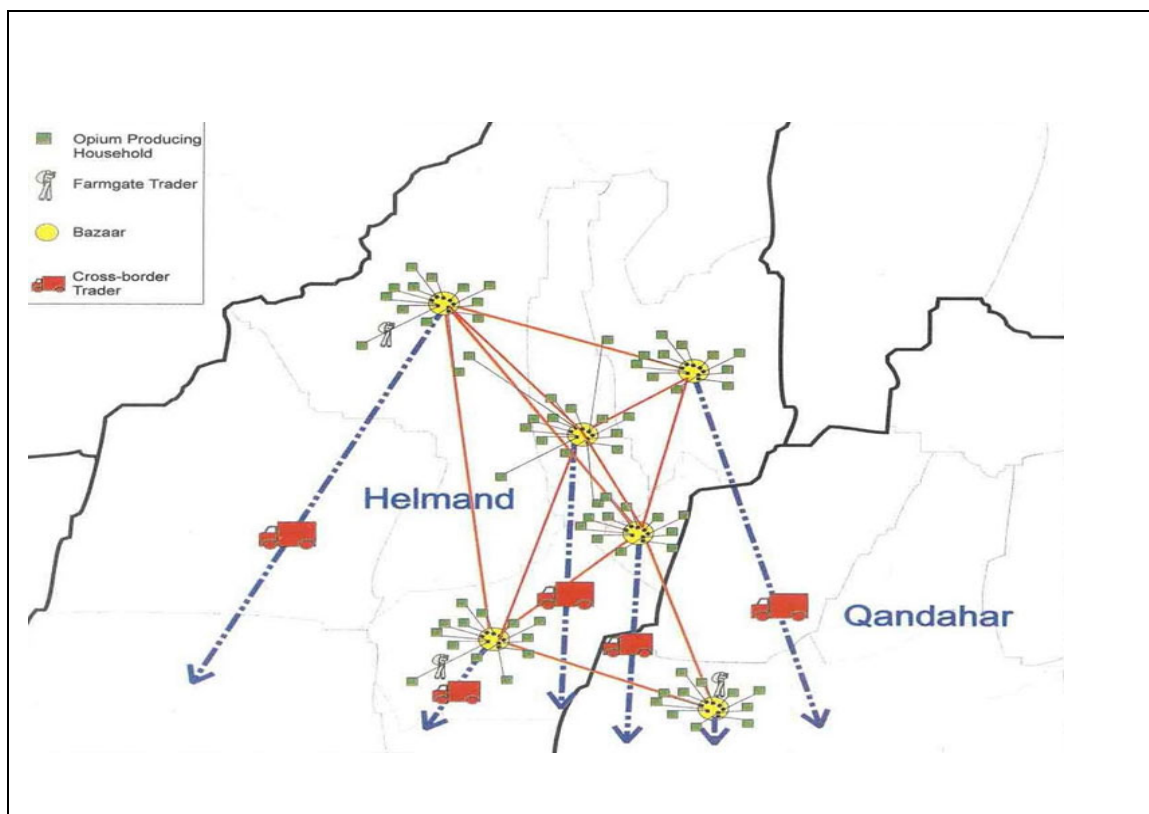


Figure 10. Regional Supply Chain Structure.

Source: Mansfield, 1998, Annex A.

⁴⁷ Michael Childress, “A System Description of the Heroin Trade” (Rand, 1994): 34.

Planting: The opium production cycle begins with the growing season. Planting usually takes place in November and December with harvesting beginning in March or April depending on the land elevation. Sprouts appear between 14 and 21 days, and within 6 weeks the plant has 4 large leaves resembling a cabbage. Within 60 days the plant will grow 1 to 2 feet high with a long and smooth primary stem; after 90 days, plants will flower for 2– 3 weeks. The growth cycle is completed in 120 days;.

Harvest is labor-intensive and specialized, and begins in April and May in the south. Itinerant laborers from Pakistan and other regions in Afghanistan travel to key cultivation areas in Helmand, Kandahar, and other poppy-producing provinces. Harvesting starts when the pods are green and have not begun to bloom. The typical poppy plant has around three pods that will be ready for lancing at various times, and each pod can be lanced between three and ten times. Harvesting is very labor intensive, and laborers can earn up to \$20 a day..

Once the plant flowers and the leaves fall off, lancing of the pod takes place. Skilled laborers move into the area and during the afternoon they begin to score the pods, making incisions at a depth of approximately one millimeter. The depth of the incision must be precise so that the opium latex does not fall to the ground or coagulate. Once incisions are made, opium latex oozes overnight and thickens into gum as it oxidizes in the cold night air. In the morning, the opium latex is then scraped from the bulb and packaged into a raw opium cake that is wrapped in poppy leaves and transported to a processing lab.

Once the opium is harvested, it is sold as wet opium called *Tor*. It is stored by packing into a cake which is wrapped in poppy leaves and tied. It is during this time

following harvest that the Taliban start collecting taxes from local poppy farmers. It is also noteworthy that harvest time coincides with the beginning of the fighting season—but there is a lull in fighting until the poppy harvest is finished, at which time the opium trade begins.

Processing: The first step in opium processing is to add the opium cake to boiling water and lime in a 55-gallon drum, which causes the opium to dissolve. The opium becomes soluble in the lime water and is filtered through a fabric sack. Once the opium is filtered out of the lime water and put in a sack, it is placed in a press to squeeze the remaining limewater out of the opium. Ammonium chloride is added so that the opium becomes insoluble in water, therefore ensuring that the remaining lime water is not wasted and can be reused.

Once the opium is filtered and pressed it becomes a morphine base that is then handpacked into cakes or spread out and laid on a sheet to dry in the sun. Once dry, the morphine base is then converted into morphine hydrochloride by dissolving the morphine base into hydrochloric acid in which activated charcoal is added. Once dry, acetic anhydride is added to the morphine base making the morphine base acetic anhydride (i.e., heroin). Acetylation water is added to make heroin acetate which is filtered. Soda ash is added to the heroin base and then filtered and laid in the sun to dry.

The initial processing of opium into heroin requires equal quantities of morphine and acetic anhydride which are heated in a glass or enamel-lined container for six hours at 85°C. The morphine and acid combine to form impure diacetylmorphine. Next, water and chloroform are added to the solution to precipitate impurities. The solution is drained, and sodium carbonate is added to make the heroin solidify and sink. Then, the

heroin is filtered out of the sodium carbonate solution with activated charcoal and purified with alcohol. This solution is gently heated to evaporate the alcohol and leave heroin, which may be purified further. Purification in the fourth stage, adding ether and hydrochloric acid, is notoriously risky. The final product is a fluffy, white powder known in the trade as #4 heroin.

Distribution: the opium trade can be further broken down in terms of the actors that are part of the process:

- Farmers who cultivate poppies for income used primarily to support their family. They sell opium gum to opium brokers who visit farms at harvest, or to opium brokers who run shops at town bazaars.
- Opium brokers usually buy opium gum from poppy farmers directly and sell the product in the bazaars at a markup.
- Smugglers are hired by the brokers, drug barons and/or warlords to transport to another broker and to bring to a processing lab.
- Drug barons use their network and access to illicit drug markets to distribute the product to the international market.
- In the international market, overseas traffickers receive drugs and begin distribution. The drugs move among regional wholesalers, to smaller wholesale dealers, and finally to street dealers located mainly in Europe, Africa, and parts of Asia.

Historically, this distribution network originated in the 1920s when the Soviet Union began providing military and economic aid to Afghanistan. In the 1950s, the United States began injecting aid into southern Afghanistan via the Helmand Valley

Authority (HVA), a project intended to revive the Helmand River. However, the ulterior motive of the HVA was the strategic move by the United States to gain additional support in the region against the Soviet Union. Unfortunately, as the U.S. is finding out today in Afghanistan, the local farmers and tribes of that time did not want to become legitimate agricultural farmers, so after three decades the project was halted.⁴⁸ Nevertheless, the lasting impact of the HVA project was finally felt 50 years later in 2000 when the Helmand Valley produced 39% of the world's heroin.⁴⁹

While the Soviet Union and the United States were in the midst of the Cold War during the 1960s, the Afghan government forced a degree of superpower cooperation. U.S. road projects from the south, for example, eventually had to meet with their Soviet counterpart projects from the north. By 1970, new roads constructed by the U.S. and U.S.S.R had given rise to a new economic force within and outside of Afghanistan: Afghan-Pakistani trucking merchants. It was through the rise of these merchants and the construction of new roads in Afghanistan that a more robust illicit economy began to develop. This illicit cross-border economy encouraged Afghanistan and Pakistan to sign the Afghan Transit Trade Agreement (ATTA), which allowed Afghanistan to import select commodities duty-free, and goods were then smuggled back across the border and sold in Pakistan. By 1988, the infrastructure created by ATTA (more trucks, roads, and private teamsters) was moving arms into Afghanistan. The creation of ATTA contributed

⁴⁸ Nick Cullather, "Damming Afghanistan: Modernization in a Buffer State," *Journal of American History* 89, no. 2 (2002): 529.

⁴⁹ United Nations Office of Drugs and Crime (UNODC), *Afghanistan Opium Survey, 2000*. Available from: http://www.unodc.org/pdf/afg/afghanistan_opium_survey_2000.pdf.

to the development of the illicit economy in Afghanistan and created the infrastructure to move large quantities of opium out of the country.⁵⁰ As Barnett Rubin points out:

Under ATTA, listed goods can be imported duty-free in sealed containers into Pakistan for onward shipment to land-locked Afghanistan. Many if not most of the goods were instead sold in smugglers markets in Pakistan. During the war, the trucks used in this lucrative trade were also leased for arms transport, income from which expanded the capital available for investment in smuggling linked to the ATTA, as well as the growing drug trade.⁵¹

From 1956 to 1978 the Soviet Union provided Afghanistan with US\$1.265 billion in economic aid and roughly US\$1.250 billion in military aid.⁵² Thus, when Afghanistan spun into turmoil in 1979, the Soviet Union had significant economic interests at stake, which led to a ten-year Soviet intervention. In the early 1980s, the United States and Pakistan formed a clandestine operation via the CIA and Pakistani intelligence service (ISI), and began financing, arming, and training an Afghan resistance force.

The international economic significance of this operation and its relationship to the opium trade was crucial. Once the operation to arm the Afghan resistance got underway, an arms delivery pipeline was established and began to deliver massive amounts of war materials into Afghanistan. Because of the clandestine nature of the operation, skilled Afghan and Pakistani smugglers were hired to bring weapons and other material across the border.

The unintended results of this operation was an arms pipeline that went into Afghanistan—and served as an opium pipeline going out. By 1985 31% of the global

⁵⁰ Goodhand, “Frontiers and Wars,” 197.

⁵¹ Barnett Rubin, *The Political Economy of War and Peace in Afghanistan* (New York: Center for International Cooperation, 2000), 23.

⁵² Rubin, *Political Economy*, 22.

share of opium production came from Afghanistan.⁵³ An immense narcotics trade developed under the umbrella of the CIA/ISI, which went to the heart of the Pakistani state and involved collusion among the *mujahedeen*, Pakistani drug dealers, and elements of the military.⁵⁴ Figure 11 illustrates the movement of opium along these transfer routes in order to understand the complex network of the opium value chain and its link to the international market. It was now a system with an input (e.g., opium embarking on a path to an illicit destination), an output (opium reaching its illicit destination), and a pathway through the system connecting the input to the output: farmers, processors, and traffickers.

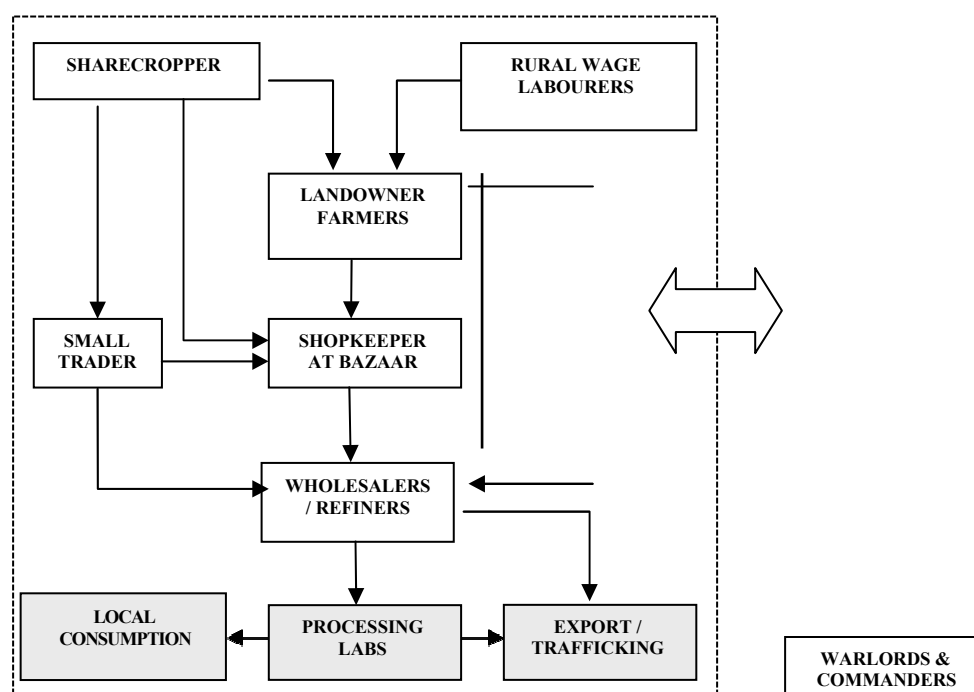


Figure 11. Overview of Opium Value Chain

Source: Pegge, 2005.

⁵³ John K. Colley, *Unholy War: Afghanistan, America and International Terrorism* (London: Pluto Press, 1999), 131.

⁵⁴ Goodhand, "Frontiers and Wars," 198.

Chapter VI

Analysis of the Opium Supply Chain

To operate effectively, a supply chain needs to be a coherent system that combines its constituent parts or factors. The factors of interest include inventories, desired inventories, number of items in transit, the desired number of items in transit, current demand, and expected demand. Each constituent part of the supply chain should be relevant, meaning the supply chain should not include activities that, whether completed successfully or not, have no impact on the flow of opium through the chain.⁵⁵ A coherent chain should not include elements that, when changing status from inactive to active, reduce the flow of opium and produce negative outputs.⁵⁶ It is apparent, however, that this restricted characterization of the opium supply chain does not sufficiently explain its complex reality.

As will be clarified shortly, agents' decisions have a major impact on the flow of opium. These decisions are both physically and culturally derived from within the agents' social network. Traditional supply-chain analysis examines a system in order to understand the efficiency or inefficiency of product and financial flows along the chain.

⁵⁵ Suzanne Pegge, "The Opium Economy in Afghanistan: A Supply Chain and Network Analysis" (Netherlands: Wageningen University and Research Centre, Agrotechnology and Food Innovations Institute, 2005), 100.

⁵⁶ Pegge, "Opium Economy," 279.

However, to analyze the opium supply chain, we need also to factor in information flows and consider the social networks in which that information is derived.

Agents involved in the opium trade, like other illegal trades, must adapt quickly to environmental changes, social pressures, and external shocks. Agent decision making must learn to adapt when conditions change, which in turn changes the supply chain. These decisions are both physically and culturally derived and reside in their social network. For example, in tribal agricultural societies, there are multiple ways to resolve debt besides currency or collateral. Farmers have been known to marry off young daughters to excuse a debt.⁵⁷ The triggers that lead to a decision point are both physically and culturally defined, a combination of traditional growing seasons with the current and predicted weather which determine when a farmer plants his crops.⁵⁸ These decision points can alter the structure and value of the supply chain, enhancing the system's ability to adapt. Over time, if the farmers, individuals, and organizations in supply chain do not attempt to protect themselves from attacks, to recover from them, or to adapt their methods, external shocks might produce enormous damages on the efficiency of the exchanges between agents along the chain. Accordingly, targeted individuals and organizations did not attempt to protect themselves from attacks, or recover from them, or adapt their methods

⁵⁷ David Mansfield, Christopher Ward, Peter Oldham, and William Byrd, "Afghanistan: Economic Incentives and Development Initiatives to Reduce Opium Production," World Bank, 2008: 5. Available from: <http://siteresources.worldbank.org/SOUTHASIAEXT/Resources/223546-1202156192201/4638255-1202156207051/fullreportAfghanistanOpiumIncentives.pdf>.

⁵⁸ Jennifer H. Watkins, Edward P. MacKerrow, and Terence Merritt, "Simulating the Afghanistan-Pakistan Opium Supply Chain" (Los Alamos, NM: Center for the Scientific Analysis of Emerging Threats, 2010): 8.

For the opium supply chain, the key decision made is that agents choose to protect themselves from attacks, recover from them, and adapt their methods. If the farmer decides to plant poppies, production just increases; if agents choose to protect themselves and their product from external shocks, the system becomes resilient. Resilience is the capacity of a system to accomplish its tasks in the face of external shocks.⁵⁹ The ability of the opium supply chain to preserve existing exchanges between buyers and sellers despite external pressure aimed at disrupting the trade is a crucial contributor to its resiliency.

Evidence of this market resiliency can be found in 2017 market numbers in which Afghan poppy farmers earned a combined US\$1.4 billion at the farm-gate, corresponding to roughly 7% of GDP or about 30% of the value of the licit agricultural sector of Afghanistan.⁶⁰ This record high opium production led to swift expansion of the illegal opium economy in 2017. Worth between US\$4.1 to \$6.6 billion in 2017, it represented between 20% and 32% of Afghanistan's GDP.⁶¹ The opium economy was approximately the size of the entire agricultural sector of the country and exceeded by far the value of Afghanistan's licit exports of goods and services in 2016 (estimated at 7% of GDP).⁶²

The decision to participate in the drug supply chain at any stage is rational from the point of view of risk acceptance, but it is "boundedly rational" individuals who react to the changes within the constraints they face and the environment in which they

⁵⁹ Martin Bouchard, "On the Resilience of Illegal Drug Markets," *Global Crime* 8, no. 4 (2007): 329.

⁶⁰ UNODC, "Afghanistan Opium Survey 2017," 5.

⁶¹ UNODC, "Afghanistan Opium Survey 2017," 5.

⁶² UNODC, "Afghanistan Opium Survey 2017," 5.

operate.⁶³ This means they are not always able to acquire and process all the necessary information to trade off all the alternatives. This is because information acquisition within the system is costly, and the processing of information is cognitively time-consuming. The agent's acquisition and processing are both costly and time-consuming because the information needed to enter the market must be collected from both environmental and socioeconomic determinants. As a consequence, a risk-based optimization problem occurs within the supply chain when agents make investment decision to enter or exit the market, forcing actors within the system to adapt, and counter-intuitively, make the system resilient. Product value is created, and supply chain efficiency is enhanced and captured via input of risk and choices. As a result, bounded rationality and market complexity are inextricably linked and affect the nature and structure of the supply-chain. Figure 12 is a conceptualized framework defining the risk of opium cultivation derived from the UNODC/MCN village surveys and ancillary data. The risk of opium poppy cultivation can be assessed by considering environmental suitability and socioeconomic vulnerability separately, and then by looking at both together, which results in three maps. Risk is composed of environmental and climatic suitability and vulnerability to illicit cultivation determined by socioeconomic factors.

⁶³ Maciej M. Łatek, Seyed M. Mussavi Rizi, and Armando Geller, "Persistence in the Political Economy of Conflict: The Case of the Afghan Drug Industry," Association for the Advancement of Artificial Intelligence (VA: George Mason University, 2010), 87.



Figure 12. Framework Defining the Risk of Opium Poppy Cultivation.

Source: UNODC, “Afghanistan Opium Survey 2014,” 34.

In Afghanistan, the opium supply chain crosses vast geographic distances. In doing so, there are active illicit networks that, from a social network perspective, are in very close proximity. This proximity acts to scrutinize the trade for irregularities, especially given the large sums of money involved, but also to monitor where individuals are to reduce risk.

Social relationships are mostly homogenous in nature and are strengthened by the bonds that individuals have with each other, often based on mutual family, tribal relationships, and a common region or village of origin in Afghanistan. Most of the mutual social relationships of members of the opium network are multiplex and layered. They relate to several life areas which create trust, reduces risk, adding economic value. These social relationships are reflected in the resiliency and adaptability of the social and economic network of the supply chain. The size of such a network is complex. There are many places in the region where contacts are needed, and people have to know each other

well to minimize risk. The network is highly dense, and virtually any conceivable social relationships are filled. Many are direct relationships because everybody knows everybody else through existing family relationships, thus creating strong network cohesion.⁶⁴

These close-knit social networks, along with suitable land and climate, low-cost labor, chemical supplies, processing laboratories, transportation, distribution, capital, and security all come together to form the activities needed to create product value along the supply chain. These supply-chain activities absorb and become absorbed by other activities in the places they are localized, becoming “territorial embedded” in the livelihoods of local populations.⁶⁵ Moreover, there is strong network embeddedness within and between farmers, traders, anti-government forces, criminal organizations, and government institutions.

The opium supply chain is a vital element of the Afghan economy which benefits the livelihoods of many Afghans who engage in cultivation, work in poppy fields, or participate in the illicit drug trade (see Figure 13). Opium poppy provides much-needed income to many impoverished farming households in rural areas and is a source of wealth creation for those who are in power. Opium poppy affords employment for many landless persons, often migrant workers, who work as opium poppy harvesters on the fields. However, there also is extensive interpenetration and interdependence between the opium market and local and central political interests and armed groups. The evidence suggests

⁶⁴ Gerben Bruinsma, and W. Bernasco, “Criminal Groups and Transnational Illegal Markets,” *Crime, Law and Social Change* 41, no. 1 (2004): 81.

⁶⁵ John Miltenburg, “Supply Chains For Illicit Products: Case Study of the Global Opiate Production Networks,” *Cogent Business & Management* 5 (2018): 2.

that drug profits are financing local warlords and the political elite, but those same profits also sustain many poor people.

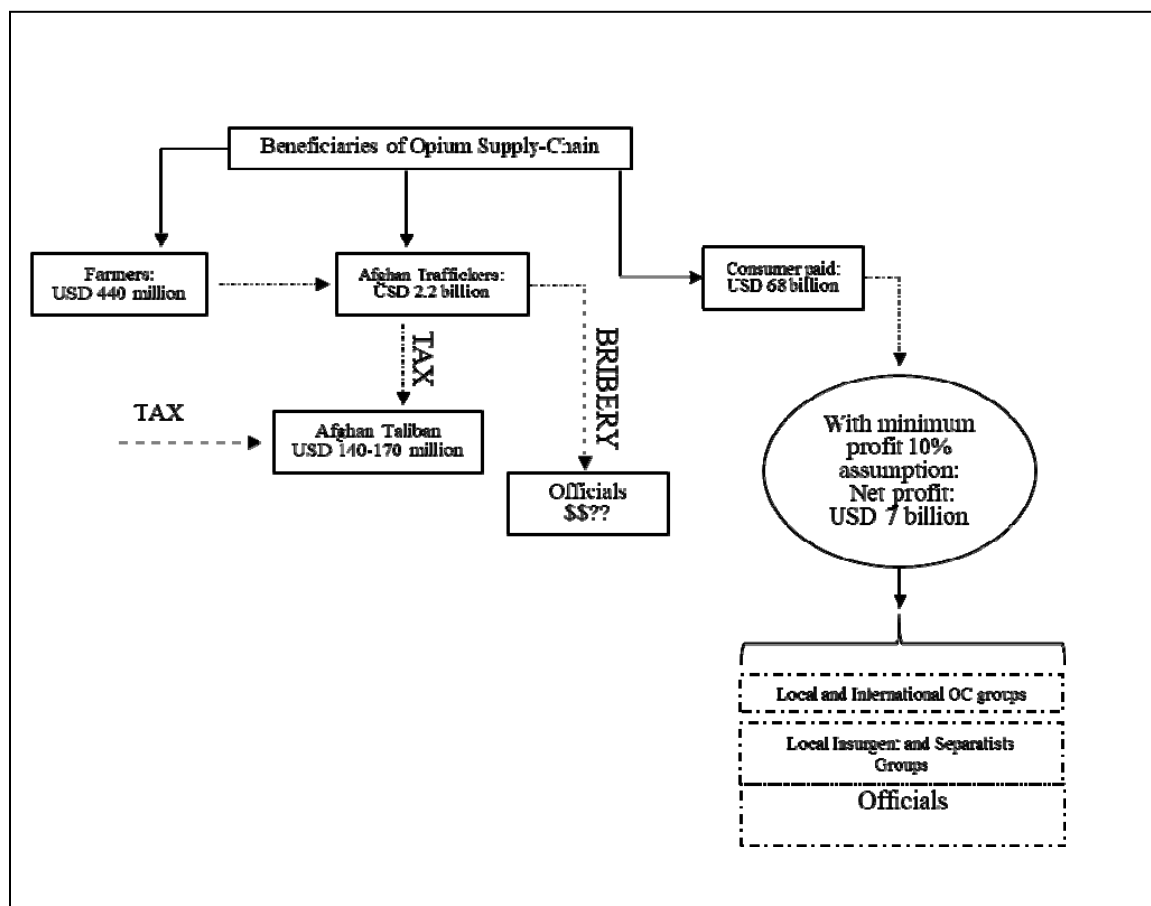


Figure 13. Beneficiaries of the Opium Supply Chain.

Source: Adapted from Childress, 1994.

At the outer link of the opium supply chain are the itinerant farm-gate buyers who purchase directly from farmers and provide advice, input, and/or credit. They may buy forward on commission with slim margins, suggesting that entry is not restricted, trading is competitive, and there is no significant risk premium. Closer to the center of the chain

are the shop owners in the regional opium bazaars who may buy from farmers or itinerant traders. They sell to local consumers, clandestine labs, wholesale traders, foreign traffickers, or anyone interested in taking a position in opium. They may pool resources and put together larger consignments. At the center of the trade are the bulk buyers, large-scale traders who buy throughout the year and organize shipments direct to border areas or directly abroad. This group consists of a small number of large traders, often linked by family ties, willing to commit substantial capital. The rewards are great, but the risks are proportionate. The risk of interdiction is perhaps less than the risk of being cheated by foreign buyers, or the risk of commodity price and exchange rate fluctuations, which affect the international border crossing “pay-off” tax.

My research suggests that processing labs (producing morphine base or heroin) purchase the raw material (opium) on their own account, engage in processing, and then sell the output to traders and wholesalers. It is likely that labs may be “sponsored” and protected by local warlords and commanders, and such labs comprise an essential interface between the drug industry and warlords/insecurity.

The opium market operates efficiently via small-scale, rapid-turnover businesses, and despite some local market concentration, there is no evidence of cartels. However, there is large interpenetration and interdependence of the opium market with local and central political interests, armed groups. Millions of people participate in the profits in a broad network of protection and payoffs. Evidence suggests that drug profits are financing local warlords and the political elite, but also sustain the livelihoods of many poor people.

The Afghan government has tried to introduce alternative crop options throughout the years with limited success. The main reason crop replacement has not been effective is because most of the alternative crop programs have relied on wheat as a replacement for opium. However, poppy and wheat are grown for very different purposes and require very different quantities and cost of inputs.⁶⁶ Some researchers argue that the high gross returns of opium are offset by input costs such as land preparation, fertilizer, and labor, whereas wheat and other competing crops cost less but have lower gross returns. Under the right market conditions, wheat could be just as profitable as opium.⁶⁷ Ultimately, there is a significant dichotomy between wheat and opium, and because of the instability in Afghanistan it is reasonable to assume that significant gains must be accomplished by the Afghan government before market conditions exist that produce the gross returns of wheat that are equal to those of poppies.

Instead of waiting for perfect markets conditions to create parity between opium and wheat, an alternative crop is currently grown in Afghanistan that is worth its weight in gold: saffron. World saffron prices at both wholesale and retail level range from US\$1,100 to US\$11,000 per kilogram depending on the quality of the saffron and market conditions.⁶⁸ Saffron commands a high price on the global market because it is a labor-intensive crop, specifically during the harvest stage, and similar to that of

⁶⁶ David Mansfield, Paul Fishstein and OSDR, “Time to Move on: Developing an Informed Development Response to Opium Poppy Cultivation in Afghanistan,” *Afghanistan Research and Evaluation Unit*, (2016), 2.

⁶⁷ Mansfield, Fishstein, OSDR, “Time to Move On,” 2.

⁶⁸ ACCI: “Afghanistan’s National Export Strategy 2018-2022 Saffron Sector Spicing Up Afghan Exports,” International Trade Centre (2018): 3.

poppies. A further reason for saffron high prices is global demand, which outpaces supply because of increased saffron use in the pharmaceutical and cosmetic industries.⁶⁹

Currently, Afghanistan is the sixth-largest exporter of saffron in the world, exporting US\$3.87 million worth of saffron in 2016, and accounting for 3.38% of the world market.⁷⁰ In 2016-2017, Afghanistan exported 2,402 kg of saffron valued at \$3.87 million.⁷¹ India is the primary destination for Afghan saffron followed by Saudi Arabia and United Arab Emirates. Table 3 summarizes these statistics.

Table 3. Saffron: Growth in Size and Production in Afghanistan.

YEAR	AREA (ha)	PRODUCTION (kg)	PRODUCTIVITY (kg/ha)
2014-15	811.8	3,390.3	4.2
2015-16	1,108	4,781.3	4.3
2016-17	2,587.7	6,081.2	2.4
CAGR (%)	78.5	33.9	-24.4
% change over time period	218.76	79.37	-42.85

Source: “Afghanistan Statistical Yearbook, 2017-2018,” 132.

Saffron is produced primarily in western Afghanistan by some 43 companies, an estimated 30 traders, and 26 saffron grower associations. From a market standpoint, there are significant barriers hindering farmers from engaging in saffron cultivation, chief

⁶⁹ ACCI, “Afghanistan’s National Export Strategy,” 8.

⁷⁰ Noorulhaq Noori, and Abdul Samie Maulavizada, “An Overview of Production and Export Trade Performance of Saffron in Afghanistan,” *Environment and Ecology* 36, no. 3 (2018): 4.

⁷¹ Noori and Maulavizada, “Overview,” 4.

among them are the high initial costs. Consequently, farmers must have sufficient savings or other financial backing to wait nearly three years for the saffron to blossom in sufficient quantities to harvest. Arguably, these initial costs could be offset by government subsidies. Aside from the year-round work for farmers, harvesting saffron requires an enormous amount of labor.⁷² For example, one kilogram of saffron requires approximately 40 hours of labor.⁷³ The processing and post-harvest of saffron flowers also employs many people, especially women, in post-harvest handling. Therefore, Afghanistan is well-positioned to employ a large segment of its population to increase saffron exports in terms of volume and value. It is possible, therefore, that Afghan saffron could replace Afghan opium as a highly prized product with a lasting brand throughout the international market.

⁷² Noori and Maulavizada, “Overview,” 4.

⁷³ Noori and Maulavizada, “Overview,” 4.

Chapter VII

Conclusion

The concept of economic complexity is not new. In 1976, Daniel Fusfeld remarked that an economy could be conceived as a complex system and economics as a branch of system theory.⁷⁴ According to Auyang,

A complex system refers to self-organized systems that have many components and many characteristic aspects, exhibit many structures in various scales, undergo many processes in various rates, and have the capabilities to change abruptly and adapt to external environments.⁷⁵

Some of the characteristic properties of complex systems are circular causality, feedback loops, non-linear cause-effect response, emergence, and unpredictability. The study of complexity involves the analysis of systems and the evolutionary and historical processes effects or has effected observed behavior.⁷⁶ Accordingly, complexity research accounts for historical processes and to living systems, but it must account for all the peculiarities of human deliberation and thought, such as the ability to make risk-based choices that may lead to large-scale, systematic violence—or the production of opium. The consequences constrain human behavior, forcing changes to the environment and socioeconomic structures in which they act.

⁷⁴ Fusfeld, quoted in: Igor Matutinovic, “Economic Complexity and the Role of Markets,” *Journal of Economic Issues* 44, no. 1 (2010): 31–51. Available from: <https://www.jstor.org/stable/40647709?seq=1>

⁷⁵ Sunny Y. Auyang, *Foundations of Complex-System Theories in Economics, Evolutionary Biology, and Statistical Physics* (UK: Cambridge University Press, 1998), 10.

⁷⁶ Matutinovic, “Economic Complexity,” 31–51.

Afghan farmers grow poppies because of comparative advantage—it is a low-risk crop in a high-risk environment—and poppy production provides access to land and credit for resource-poor farmers. There are also armed groups and individuals inside and outside Afghanistan who benefit from low labor costs and high payout of opium production. More importantly, there is a worldwide consumer base that is addicted to the product.

The socioeconomics of the conflict in Afghanistan also play a significant role in the complexity of the opium trade. Due to the seemingly endless wars in Afghanistan, people have witnessed the collapse and revival of the state as well as the destruction of many of the country's assets and the people themselves have suffered massive displacements. These upheavals make the cultivation of opium more beneficial than producing staple crops. Moreover, because of climate and soil conditions, Afghanistan can produce higher yields of opium than the global average.

More research is needed in order to better understand the economic, social, military, and political processes that operate efficiently within the opium trade, followed by an analysis of the crime-insurgent facilitation networks, which may reveal patterns of corruption that perpetuate the opium market and enable it to continuously adapt.

This type of analysis may expose areas where policymakers could devise innovative regulatory measures that effectively alter the motivations of originally ideologically motivated insurgents, the farmers, and other players within the system. Indeed, the possibility that regulation may alter insurgent groups and terrorist organizations' motivational structures may over time have substantial implications for understanding the evolution of conflict and its relations to complex systems and

economic studies. But to date, the opium trade is a classic complex adaptive system that has survived and thrived in a country that has been in a state of war for the more than 30 years. A lack of regulation allows the opium trade to operate as a formal and informal learning system, sharing information and forming communities of proactive participants that continually evolve their trade practices to create profit.

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