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The Perverse Effect of Sin Taxes: The Rise of Illicit White Cigarettes

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Abstract

Illicit white cigarettes are cigarettes that are legal in the country of production, but are illegally smuggled into other markets where no tax is paid. This paper analyzes whether taxes create a price wedge between legal and illicit cigarettes and thereby affect the availability and trade of illicit whites across markets. Through original, self-conducted point-of-sale surveys and discarded pack collections across 18 cities, we find that cigarette taxes significantly affect the market for illicit whites. Moreover, based on a smoker survey, we find that the illicit white market is supported by consumers willing to purchase illicit products for their reduced prices. It is beyond the scope of this paper to ascertain the optimal tax rates on cigarettes or the stringency of enforcement measures to reduce smoking rates (the desired health outcome). However, gaining a better understanding of the effects of taxes on illicit white trade and consumption is vital because our research suggests that current “sin taxes” drive illicit activity and therefore reduce the effectiveness of higher taxes in curbing the use of cigarettes.

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I. Introduction

“Sin taxes” are often used to discourage consumption of goods such as cigarettes, alcohol, sugar-sweetened beverages and other goods typically considered unhealthy. By raising the price of cigarettes, policymakers attempt to combat smoking and increase social welfare (Lockwood and Taubinsky, 2017). In this paper, we study whether these well-intentioned efforts inadvertently drive the illicit market in cigarettes.

Illicit or illegal trade in cigarettes takes four main forms. The first is contraband, which involves the smuggling of cigarettes, often well-known brands, across borders illegally, without paying domestic duties. A second is counterfeiting, which is the illegal manufacturing of cigarettes carrying a trademark without the consent of the original owner of the trademark and with an obvious intent to deceive consumers and avoid paying domestic duties. The third is the production and under-declaration of domestically produced products so as to avoid excise taxes. Fourth is the production and sale of illicit whites. Illicit whites are legally produced in their own country of manufacture and may face local taxation, but then are illegally sold in another country where no domestic duties are paid.

In a series of earlier papers, we analyzed the availability of counterfeit and substandard medicines (Bate, Jin and Mathur, 2015 and 2011). In this paper, our focus is not on the illegal manufacturing of products, but on the smuggling of products across borders and their illegal sale in those countries or cities, for the explicit purpose of avoiding taxes and providing a cheaper alternative to existing brands.

Historically, illicit trade in tobacco products was mainly contraband, especially the smuggling of international brands, like Marlboro (World Health Organization, 2005). Typically, price differentials between countries would create incentives for criminals to smuggle genuine cigarettes from lower-priced to higher-priced markets. However the enhanced controls in the supply chain, including the implementation of tracking and tracing solutions, and strict compliance procedures introduced by the largest manufacturers led to a significant decrease in the smuggling of contraband cigarettes (European Commission, 2016; Bate, 2016). Over time, criminals realized that copying such renowned brands allowed the trademark owners to target them in legal proceedings (Aries and Panichi, 2016).

Additionally, as they realized that better margins could be achieved by making cigarettes themselves, criminal networks and less ethical manufacturers moved into production of tobacco

products. A new trend emerged, the creation of illicit whites. Given that the most important component of smuggling these days is of illicit whites, that is the focus of this paper.

Major cigarette brands comply with domestic content and packaging requirements (including warning labels, where required) and their producers pay taxes in each jurisdiction. Illicit whites are not sold domestically, usually have no legal foreign markets, and their manufacturers and intermediaries typically make no attempt to comply with any packaging requirements. They are deliberately smuggled into higher-tax jurisdictions without paying any of the requisite duties (European Commission, 2016). Some manufacturers of illicit whites are small-scale or mid-size operations based in free trade zones with no domestic or otherwise legitimate markets, others are large manufacturers with legitimate markets that are careless, in how some of their products are distributed by third parties.

Although illicit white producers make a legal product to begin with and do not counterfeit existing brands, they or their intermediaries often fake tax stamps, so as to pass off as legitimate in markets where they have no legal business. In Figure 1, we show photos of tax stamps from Brazil, Turkey and California, with the real stamps on the left and the fakes on the right. The fake Brazilian tax stamp probably can from Paraguay, and the fake Turkish stamp probably came from the Jebel Ali free zone in Dubai.

An example of illicit whites, provided by the World Customs Organization, is “Jin Ling” which is manufactured outside the European Union but was the second most seized illegal brand within the European Union in 2008 (Allen, 2011). Since the explicit purpose of the trade appears to be to avoid paying taxes in the country of sale, it seems natural to speculate whether tax differentials across countries are driving much of this trade. That is one of the questions we explore in this paper.

The World Health Organization (WHO) estimates that nearly 10 percent of all cigarette and tobacco products consumed globally are illicit or illegal (WHO, 2015). The availability of illegal, and cheap, cigarettes poses a particular challenge for low-income households and youth. First, since these types of products typically do not adhere to local health regulations or restrictions aimed at curbing tobacco use and are priced lower than other products, they are more likely to cause harm either because people are better able to afford them and over-consume them or because they are less conscious of the harm that such products can cause to their health. The Dutch National Institute for Public Health and the Environment demonstrates that the levels of cadmium and lead

are more than five times higher in illicit cigarettes than in genuine cigarettes (Allen, 2011). Other sources cite high levels of nicotine, pesticides, arsenic, rat poison and human feces in these products. Yet others report that the methods of concealment of these products are themselves dangerous, often using toxic chlorine gas.

There are also economic implications of the illicit cigarette trade, since by avoiding tax payments local government revenues are reduced. According to the Framework Conventions Allowance, globally countries have lost a combined \$40.5 billion to illicit trade in tobacco products. The European Commission estimates that European Union member states have lost €10 billion in tax revenues (Allen, 2011).

According to the World Customs Organization, illicit tobacco trade is increasing at a fast pace and cigarettes today are among the most illegally trafficked goods in the world (Allen, 2011). Between 2012 and 2013, the quantity of seized chewing tobacco jumped from 8 tons to 38 tons, an increase of nearly 500 percent (WHO, 2015). The primary source countries of illicit whites vary across regions. Within Asia, the primary sources are China, North Korea, the Philippines, the United Arab Emirates and Vietnam. Paraguay appears to be the primary source for illicit whites in Brazil and other South American nations. In recent years, illicit producers have set up factories within the EU (Allen, 2015). Bulgaria, Belarus and Greece provide much of the product for EU (Euromonitor, 2016).

A primary reason for the flourishing of markets for illicit tobacco is that many smokers are happy to participate in the market. A study by O'Connor et al (2012) finds that a quarter of smokers of menthol products said they would purchase illicit versions if menthol cigarettes were banned. In the United Kingdom, studies have found that most young smokers are aware of the illicit market, a considerable minority were offered illicit cigarettes, and over half of those offered purchased them (Moodie, Mackintosh and West, 2010). Of note, poorer communities had positive attitudes to illicit cigarettes since prices of legal products were considered unreasonably expensive.

Another key component is whether illicit products are easily available. Kelton and Givel (2008) found that there are numerous production plants in Native American reservations across the US. Further, while a US Customs Court concluded in 1937 that Native Americans are subject to the same duties when trading tobacco products, there is an assumption that Native Americans have the right to make and sell products without paying duties. Even if legally incorrect, the notion that people are doing nothing wrong may be central to why the market for illicit tobacco is

allegedly so deep and extensive.

Some earlier papers have attempted to understand the nature of the illicit white trade and the factors driving it. Ciecierski (2007) investigated illicit cigarette markets in Poland using a dual survey approach: interviewing individuals to determine personal use of illicit cigarettes and gathering information directly from tobacco points of sale. She finds that 11 percent of cigarettes sold in Poland between 2004 and 2006 were illicit, and that the illicit market share was steady over time.

Others have investigated the role of tax avoidance and illegal production. Aziani et al. (2016) collected discarded cigarette packs from 23 cities across the United States. Their dataset includes over 100,000 observations with important details, including tax status and counterfeit status. They find a great deal of tax avoidance and illicit trade, particularly in New York City. Prieger and Kulick (2016) investigate the illicit cigarette trade across Europe. They find that raising the cigarette tax by €1 increases the illicit market share by 5 to 12 percentage points.

Kulick, Prieger and Kleiman (2016) explicitly attribute illicit cigarette markets to the taxation, regulation and prohibition of cigarettes. They argue that consideration of taxation and enforcement mechanisms must include the negative impacts of such policies, including greater violence, greater revenues in illicit markets, and negative public health consequences. Public health efforts to reduce cigarette smoking reduce the affordability of legal cigarettes and drive consumers toward the illicit market. Well-meaning policies create the price wedge for illicit markets to exploit. And given that illicit products are often far cheaper, it is even possible that tax hikes could even increase smoking among the subset of smokers happy to buy illicit products.

However, the market penetration of illicit cigarettes depends on the types of smuggling networks and the enforcement mechanisms against them. Ramos (2009) uses intelligence reports from various researchers to illuminate the extent of the illicit cigarette production and smuggling in Latin America. He identifies gang networks as the primary sources of illicit cigarettes. Gangs often own or have links with cigarette factories in Paraguay, and they provide the logistics, contacts and resources for smuggling. Most of the illicit tobacco market in Latin America provides cheap, little known brands, rather than counterfeiting higher end brands. Ramos also identifies various country-level efforts to combat cigarette smuggling, but these approaches are insufficient to deal with an international smuggling problem.

In this paper, we build on this information by tackling the following questions. Do tax rates

drive the trade in illicit whites? Are smokers willing to buy illicit whites because they are cheaper? We conducted three types of data collections to ascertain availability and use of illicit whites in 13 cities in geographically dispersed countries, as well as five cities in the Eastern part of the United States (New York City, Buffalo, Miami, Richmond and Charlotte). We interviewed smokers on their knowledge and use of illicit whites, we sought out locations where people buy cigarettes and tried to buy the cheapest products (knowing some might be illicit whites), and we analyzed the quality and source of discarded cigarette packs. Our basic results suggest that taxes on legal cigarettes increase the availability and prices of illicit whites. We also find that enforcement mechanisms are important but may have unintended results. Physical inspection appears to effectively decrease the illicit market share, but this can be undone by the presence of free trade zones. Tax stamps increase the legal cigarette market share by reducing the market share of nontaxed but not imported illicit cigarettes. Since these cigarettes are a competitor product to illicit whites, the use of tax stamps may inadvertently benefit IW suppliers.

The next section describes our data and methodology. Section III presents the empirical estimates. Section IV discusses the implications of our findings and Section V concludes.

II. Data and Methodology

To collect our data, we adopted the following protocol. For the point-of-sale data, a local of each city went to an establishment that sold cigarettes (e.g., news agent, tobacconist, pub, gas station, or other retailer, street kiosk) and asked for the price of Marlboro (the world's leading brand), and then asked for their very cheapest substitute (in some instances these might well be illicit whites). We recorded the prices of the products offered and whether the cheapest product was an illicit white.

We identified illicit whites in several ways. The main method was by analyzing the packaging to examine whether the product had the correct license information, tax stamps or other identifiers as being approved in the country of purchase. We also compiled short lists of the most popular illicit whites from published sources and private conversations with cigarette experts, which speeded up the process when offered multiple choices. There is a chance that a few of the products were not illicit whites, but counterfeit products, but the likelihood is very low. The most common fakes are of well-known brands like Marlboro or Lucky Strike.

We also conducted a smoker survey, in which smokers were asked about their opinions on

excise taxes, availability of illicit whites, and whether they had ever bought such products. (The survey is reproduced in Table 7 with results.) The aim was to ascertain if smokers are active participants in the illicit market.

Finally, for the discarded packs data, local points of interest were identified as the starting point for a random walk to collect discarded packs of cigarettes. The first approximately 100 packs found (from sidewalks, trash cans, etc.) on three separate walks were recorded. Town Halls or centers of government served as one location, bus or train stations served as another, and another central location (such as a movie theater or mall) was identified for the third collection. We record whether each pack was legal, nontaxed, or IW. IW packs are a subset of nontaxed packs. Untaxed or undertaxed products that are not IW are domestically made products that do not have the correct tax stamps, or are made in one state within a large country and sold in another state where tax rates are far higher (such as a pack made in Virginia and sold in New York). Nontaxed products are technically not considered illicit whites if they are not sold outside the country. Using these sources, we generate estimates of the market shares of legal and IW cigarettes.

Table 1 shows the distribution of cigarette type in each city for the point-of-sale dataset and the discarded pack dataset. The tabulations are often but not always similar. We found no IW cigarettes in Asunción. We also recorded the most frequent sources of the IW cigarettes in each location; although interesting, this information did not have a significant effect when applying gravity models of trade. Most of the IWs in Latin American cities came from Paraguay. South Korea was the main IW source for Pakistan and South Africa, and Indonesia was the main source in India and Singapore. Dubai was the primary source of IWs found in Indonesia, Jordan, Malaysia and Dubai. Note that IW cigarettes in Dubai came from the local free economic zones, where the production and import of illicit products is subject to little or no oversight.

In Table 2, we compare the local IW prices to the prices of legal cigarettes. We can confirm the similarity of our prices and observe the price differential dynamics by comparing the US dollar equivalent price of a pack of 20 Marlboros across a few selected nations (Mahapatra, 2014). Marlboro is the world's leading brand of cigarette and available in all of the sampled cities. In our sample, London provided the most expensive Marlboro at \$12.50, but in Australia (not in our sample), which has some of the highest tobacco taxes in the world, the price can reach over \$16. Our second highest price was found in Singapore at roughly \$10. This is much higher than in other Southeast Asian countries. According to Mahapatra (2014), 20 Marlboros cost \$4.20 in Malaysia,

slightly over \$2 in China, \$1.25 in Indonesia, and less than a dollar in Vietnam, Cambodia, the Philippines and Myanmar. The average prices of cigarettes we found are broadly similar to these. It is no surprise that people smuggle cigarettes into these high-tax jurisdictions. In comparison, the average price of IWs was \$4.11 in London and \$4.20 in Singapore.

We also collected country-level data to control for general demographic and smoking trends, cigarette taxes, and the difficulty of importing or locally producing illicit and untaxed goods. We collected the adult literacy rate from the CIA World Factbook to control for general education levels and knowledge of smoking harm. We also collected PPP-adjusted GDP per capita for 2015 from the IMF World Economic Outlook. To control for the prevalence of cigarette smoking, we collected the WHO age-standardized prevalence of daily cigarette smoking among those over 15 years of age (WHO, 2017). We also collect the PPP-adjusted price of the most sold brand of cigarettes in each country, the total taxes on this brand as a percent of the retail price, the specific excise and ad valorem excise taxes on this brand as a percent of the retail price, and whether the country requires the application of tax stamps to tobacco products (WHO, 2017). Although the price of the most sold cigarette brand is less comparable across countries, it may be more closely related to the price of IW cigarettes.

Although these variables are useful to control for general cigarette smoking preferences, measuring the barriers to the supply of illicit and untaxed cigarettes is more difficult. The use of tax stamps makes it more difficult to pass off nontaxed products as taxed products, but some retailers may not be aware of tax stamp requirements and many consumers intentionally purchase illicit tobacco products specifically because of the reduced price. We introduce additional controls specific to how illicit cigarettes may be brought into the country. Since the import of illicit cigarettes would require avoiding the attention of authorities or bribing them, we use the Corruption Perceptions Index for 2016 from Transparency International. We also test for robustness using the frequency of bribes and irregular payments and the extent of costs imposed by organized crime from the World Economic Forum's Global Competitiveness Report. We rescale all of these measures so that zero denotes the least possible corruption and one denotes the greatest possible corruption. We also use the percent of import shipments receiving physical inspection from the World Bank's Logistics Performance Index, and the number of free economic zones in each country to address the potential to import, produce and distribute illicit and untaxed goods. Due to the large number of free trade zones in the United Arab Emirates, all of the illicit

white cigarettes in Dubai were also produced in Dubai’s free trade zones, notably Jebel Ali Port (Bouyamourn, 2015). Similarly, illicit or untaxed cigarettes in the United States can be easily moved from low-tax states to high-tax states without inspection. Therefore, we assign Dubai and the 5 US cities physical inspection rates of zero. Summary statistics for the city-level controls, point-of-sale data, and discarded pack data are in Table 3.

III. Results

Our results rely on the combination of the point-of-sale and discarded pack datasets. We use the point-of-sale data to regress the probability that a cigarette is an illicit white on various measures to determine the role they play. We also regress the prices of the illicit whites on various measures. We then use the average price of illicit whites from the point-of-sale dataset and combine it with the discarded pack data to construct a set of quantity-price regressions.

III.A. Illicit White Availability

We first study the availability of illicit whites using the point-of-sale cigarette data. These regressions are in Table 4.

Regression (1) includes all of the demographic, tax and enforcement controls. We find that taxes matter significantly for the availability of illicit whites, as do other enforcement measures such as physical inspections and the existence of free trade zones. While higher domestic taxes in the point-of-sale country, and free trade zones, increase IW availability, the frequency of physical inspections reduce IW availability, as may be expected. The use of tax stamps does not appear as important, suggesting that purchasers of illicit whites are aware that their cigarettes are not legal.

Regression (2) excludes the enforcement controls relevant to illicit production or smuggling. In this case, while taxes are insignificant, the availability of IWs seems to be driven by the demand for cigarettes as captured by the daily cigarette use rate. This suggests that this regression may be subject to omitted variable bias from a correlation between cigarettes taxes and enforcement measures. This is also the case in Specification (3). Finally, specification (4) excludes the demographic measures including the demand or daily use of cigarettes. In this case, the tax and enforcement variables are significant.

A key takeaway from these regressions is the importance of general enforcement for the presence of illicit cigarettes, as well as the importance of consumer demand. Physical inspections

have a strong negative effect on purchases of illicit cigarettes, and free economic zones have a positive and significant effect on the presence of IWs. Countries may pair higher cigarette taxes with better enforcement, particularly in cases where the domestic demand for cigarettes is high.

Corruption also has a positive and significant effect on the presence of IW cigarettes. This is moderately robust to alternative measures of corruption. When we rerun regression (4) using the bribery or organized crime measures instead of corruption, the bribery variable is significant at 5 percent and organized crime is significant at 10 percent. The lesser significance of organized crime is consistent with the particular illegal good; illicit cigarettes are very easy to transport or smuggle and may not require massive underground distribution networks, especially since illicit whites are easily available at many types of retailers.

III.B. Determinants of IW Prices

We also assess the extent to which IW prices are affected by domestic tax rates and other variables. These regressions, shown in Table 5, demonstrate that the effect of taxes on the price of IW cigarettes is large, positive and highly significant, suggesting that higher cigarette taxes also result in higher IW prices, as consumers substitute IWs for legal cigarettes.

The use of tax stamps also has a positive effect on the IW price. Combined with the quantity regressions in Table 6 showing that tax stamps reduce the market share of nontaxed but not illicit white cigarettes, these results indicate that by eliminating the closest competitor product to IWs (nontaxed but otherwise legal cigarettes), tax stamps may cause IW cigarette prices to rise.

The coefficient estimates on the price of the most sold brand and the price of Marlboro are not robust to different specifications and have little explanatory power when controlling for taxes. This suggests that the IW price is driven more by the price wedge created by taxes than by general cigarette price levels.

Greater corruption appears to generally decrease IW cigarette prices, which is likely due to its role in easing the import, production and distribution of IWs. This result is highly robust to alternative measures of corruption. When we replace the corruption measure in regression (1) (coefficient estimate of -8.602) with bribery or organized crime, we obtain coefficient estimates of -9.03 and -10.01 respectively. The coefficient estimates are all significant at 0.1 percent but are not significantly different from each other.

III.C. Legal and IW Shares in Discarded Packs

In this analysis, we use the discarded pack data to see if the share of IWs in discarded packs is also significantly influenced by tax rates or general enforcement measures. Since taxes affect the price of legal cigarettes but not the price of IWs directly, an interesting question that arises is whether the price of IWs, relative to the price of legal cigarettes, is an important predictor of IW availability, and shares, in our discarded packs dataset.

To construct the price ratio, we use the average price of IW cigarettes for each city, and we divide this by the price of the most sold brand. We do not have IW price data for Asunción, which had no IWs, or for the US cities. The average IW prices are tabulated in Table 2.

We produce share estimates by dividing the number of IW or legal cigarette packs in each location by the total number of discarded packs collected. These two categories are mutually exclusive but not exhaustive, and we omit the category of nontaxed or undertaxed but not IW cigarettes. We regress the IW and legal cigarette shares on the average price ratio. Since the price of IWs and the share of IWs in discarded packs is likely endogenous, we instrument for the price ratio using our tax data. These regressions are in Table 6.

Regressions (1) and (2) use the legal cigarette pack share as the dependent variable, and regressions (3) and (4) use the IW share. Coefficient estimates should have opposite signs in the regressions using the IW share compared to those using the legal share.

Regressions (1) and (3) use the total tax rate on cigarettes as the instrument for price. Although the total tax rate is a strong instrument for the price ratio (since the most sold brand price includes taxes, but no taxes have been paid on the IW cigarettes), there remains the potential for endogeneity of this instrument if policymakers take the existence and extent of underground tobacco markets into consideration when determining cigarette tax rates, as suggested by the results in Table 4. To address this, regressions (2) and (4) use “other taxes”—taxes paid on legal cigarettes excluding cigarette-specific excise and ad valorem taxes—as the instrument for the IW price ratio. If IW importers, producers or distributors avoid paying cigarette taxes, they presumably also avoid paying other taxes that legal cigarette producers would have to pay (such as sales taxes, VAT, and import duties), so this instrument should affect the price ratio (although the correlation is weaker). Since it is unlikely that policymakers take the extent of illicit tobacco markets into

consideration when determining what tax rates to apply to goods in general, this instrument is exogenous.

These regressions show that as the (instrumented) relative price of IW cigarettes rises, the IW share falls and the legal cigarette share rises, as expected. Therefore, to the extent that taxes increase the legal cigarette price more than the IW cigarette price, greater taxes would increase the IW share and decrease the legal cigarettes share. In other words, higher taxes on legal cigarettes encourage greater consumption of illicit whites.

Corruption also appears to increase the IW share and decrease the legal cigarette share. As in the price regressions in Table 5, the effect of corruption is robust to the alternative measures. In regression (1), replacing corruption with bribery or organized crime produces coefficient estimates of -0.292 and -0.359 instead of -0.386; these are all significant at 0.1 percent but not significantly different from each other.

The physical inspection rate and free economic zones have similar effects as in the regressions for the cigarette data, although the coefficient estimates are less robust in these regressions. Interestingly, the coefficient estimates for the effects of daily cigarette smoking and the literacy rate have the opposite signs compared to what one may expect from the IW availability regressions in Table 4.

We also observe a positive, highly significant effect of tax stamp use on the prevalence of legal cigarettes. However, the use of tax stamps does not have a clear effect on the share of IW cigarettes. This finding suggests that enforcement of cigarette taxes through the use of tax stamps squeezes out domestic nontaxed cigarettes but does not directly impact IW cigarettes. Since IW cigarettes are often smuggled in and lack the required health warning labels, the use of tax stamps does not combat the IW share because authorities would presumably confiscate IWs instead of taxing them. This also suggests that many retailers are providing what their customers want (cheap illicit products), even though most must know that these products are illegal.

III.D. Smoker Survey Results

The literature on demand for illicit products shows that even for medicines, where no one wants a fake, people buy cheap products they can afford in the hope that they will work. For most consumer products like jeans or watches, consumers knowingly buy fake products. So there is some level of consumer complicity in buying fake or inferior products. Consumer demand for

illicit tobacco is therefore an important condition for the successful outcome of any policy decision to curb cigarette use. Our smoker survey addresses some of these questions; the questions and general results are in Table 7.

It is difficult to know whether every buyer knows that they are buying an illicit product, but the significant and often massive price differential between the leading brand and the cheapest product should be a signal to most buyers. In our survey of smokers in most of the same cities, 32.1 percent of those asked said they had bought illicit whites, and the main reason was the price—60.3 percent of those who had bought IWs cited the low price as the main reason. One even volunteered that he didn't buy illicit whites, but did buy raw smuggled tobacco to roll his own since it avoided tax.

If consumers are unhappy with the artificially high price of legal tobacco products (due to taxation) and value cheaper products, awareness campaigns against buying them may well backfire. The surveyed smokers were asked whether they thought cigarette tax rates are too high. All respondents who had bought illicit whites said that cigarette taxes are too high, as did 77.5 percent of those who had not bought illicit whites.

IV. Discussion

The WHO states that smoking cigarettes is the largest cause of preventable premature death globally. The WHO Framework Convention on Tobacco Control (FCTC) entered into force in 2005 with an aim to lower the death toll. Reacting to the spread of illicit tobacco, WHO established the Protocol to Eliminate Illicit Trade in Tobacco Products (ITP) under the FCTC in 2012. As stated in FCTC documentation:

The objective of the Protocol is the elimination of all forms of illicit trade in tobacco products. "Illicit trade" in tobacco products in this context means any practice or conduct related to producing, shipping, receiving, having possession of, distributing, selling or buying tobacco products which is prohibited by law. (WHO, 2016)

To prevent this illegal trade, the Protocol aims to secure the supply chain of tobacco products through a series of government measures. It requires the establishment of a system of control largely based on the successful EU-cigarette company agreements. This includes a global tracking and tracing regime within five years of the Protocol's entry into force, comprising national

and regional tracking and tracing systems and a global information sharing point located within the Secretariat of FCTC. Other provisions to ensure control of the supply chain include licensing and record-keeping requirements, as well as regulation of Internet-sales, duty-free sales and international transit. (WHO, 2016)

Demanding cooperation from signatories with global experts such as Interpol, the World Customs Organization, and others increases the competence of national agencies and increases the likelihood of best practices transferring.

The ITP will enter into force 90 days after the 40th party to the convention has ratified the protocol. As of August 2017, 25 parties have ratified. The FCTC Secretariat has set a goal of achieving 40 signatories by the end of 2017, which is possible but appears ambitious.

While sound in principle, the ITP faces numerous challenges in implementation. The ITP's primary objective is to control the supply chain of tobacco products, which necessitates a very high level of international and commercial cooperation. The requirement that participants in tobacco supply and distribution know what is where at all times is designed to limit the chances for diversion of legitimate products and insertion of counterfeits. If authorities have the correct legislation in place, they can then prosecute and perhaps prevent criminals undermining the supply chain more easily.

The spillover effects of production and trade in tobacco require most if not all jurisdictions to share aims and ambitions; without that, coordination will likely fail. It is incumbent on individual governments to control demand and police free trade zones (FTZs), where illicit activity of all kinds proliferates.

Voluntary support for the protocol is patchy. For example, the United Kingdom, Russia, India and China are parties to the Framework Convention but have not ratified the protocol; the US is not even party to the convention (United Nations, 2003).

Since 2004, cigarette manufacturers and the European Union have cooperated in comprehensive systems, including “track and trace” operations, aimed at limiting illicit activity. These agreements have drastically reduced smuggling of major brands. Better control of the major cigarette supply chain has changed the nature of the illicit market, notably driving illicit white production and trade. Therefore, it is likely that only with the cooperation of the entire supply chain (including the illicit white cigarette companies and governments that currently allow smuggling) will illicit tobacco be controlled.

But the WHO's FCTC rejects the EU approach due to the involvement of the legitimate industry. Cigarette manufacturers and any group that has ever worked with them are explicitly excluded from implementation of the protocol, including Interpol, which received funding from Philip Morris International (WHO, 2016). This turns the difficult task of controlling supply chains into an impossibility. None of the illicit white manufacturers, or the governments that house them, have any interest in controlling their supply chains.

All would not be lost from a protocol since the WHO's constitution states that it should seek assistance from other UN bodies. Yet FCTC is not collaborating fully with the World Customs Organization, which has an explicit role in enforcement, nor with the UN Office on Drugs and Crime, which already operates and enforces agreements that would be fundamentally useful to FCTC (Sou and Preece, 2013).

Meanwhile, the illicit tobacco market is flourishing. The trade in illegal cigarettes, particularly through free trade zones and sometimes with the collusion of governments, is huge, lucrative, and sophisticated. Without assistance from international security experts and producers, and without funds to offer signatories in technical assistance, the WHO's Illicit Trade Protocol has only a slim chance of being implemented in emerging markets, even if nations ratify it.

A critical factor in implementing the protocol overlooked by health specialists at the WHO is the complicity of smokers in demanding illicit products. Retailers, especially in poorly policed locations, will provide what their customers demand. Our results indicate that markets close to illicit trade production, with weak enforcement and relatively high taxes on legal cigarettes, see greater demand for illicit whites. But even markets physically remote from illicit white production, such as South Africa, are replete with the products.

It is common knowledge where the products come from. Paraguay is a hub for South America, and the UAE is a hub for Asia and Europe. Other locations like Bulgaria and Belarus supply key EU markets. But such knowledge accounts for little. As excise tax increases are pushed through on legal products in myriad markets, cheaper illicit products find consumers. The success of combatting contraband of major products in the EU occurred because the companies making those products were pressured to control their supply chains, and organized EU nations improved enforcement of laws to limit smuggling of brands. Attempts to combat illicit whites were not really undertaken, primarily because the focus was on the legal products.

Until the illicit white producers are effectively pressured, a reduction in illicit whites is

unlikely to occur, especially outside of the EU and other OECD nations. Simple-sounding solutions like tracking and tracing systems on packaging and tax stamps are touted as a key to success by the WHO FCTC Secretariat. Such efforts successfully limited contraband of major brands, but that was because the brand holders are predominantly law-abiding firms that want to participate in legal schemes and prevent criminal activity. Illicit white suppliers obviously have no such incentive.

We also find that illicit whites are more expensive in markets with tax stamps. This reflects higher prices of major brands that are complying with the law. (Track and trace systems also push up legitimate producers' costs and hence prices.) Therefore, it is possible that tax stamps do not decrease the market share for illicit whites but increase their prices, potentially increasing the profits of their manufacturers. This feeds into a larger picture, which is that as efforts to reduce smoking ramp up globally, the legitimate sellers' products become more expensive, which makes the illicit products relatively more attractive. These products pay no tax and are likely as harmful or more harmful to health. In other words, without thought to how consumers respond to price increases of legitimate products, demand for illicit products likely will continue to expand. Well-meaning policies create the price wedge for illicit markets to exploit.

V. Conclusion

In general our results suggest that taxes on legal cigarettes drive the demand for illicit tobacco and especially illicit whites, which are products made legally and then smuggled into markets where tax is not paid. As the WHO ramps up efforts against smoking, governments increase taxes on legal products and the legitimate companies help limit contraband, the incentives for illicit white supply increase. By conducting point-of-sale and discarded pack collections, we estimate the impacts of taxation and enforcement on the availability, price and discarded pack share of IW cigarettes. Based on these results and the smoker survey, the illicit white market is supported by consumers willing to purchase illicit products for their reduced prices. The impact of taxes on prices creates the wedge that drives the illicit white market.

Most efforts to control illicit tobacco aim to control the supply chains, but since the supply chains of illicit producers have proven elusive to authorities' actions, illicit whites are likely to flourish in the foreseeable future.

It is beyond the scope of this paper to ascertain the optimal tax rates on cigarettes or the

stringency of enforcement measures that are needed to ensure lower smoking rates (the desired health outcome). However, gaining a better understanding of the effects of taxes on illicit white trade and consumption is vital because our research suggests that current sin taxes will increase illicit activity and even lead to the perverse outcome of encouraging, rather than discouraging, smoking among users accessing illicit products.

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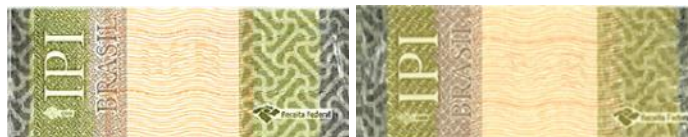
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Figure 1:

Two Brazil tax stamps: The one on the left is genuine, and the one on the right is fake.



Turkish tax stamps, real and fake



California tax stamps, real and fake



Table 1: Cigarette Quality Distributions

City	Discard tabulations				Point-of-Sale tabulations			Main IW source
	Legal	Nontaxed	IW	Obs	IW	Not IW	Obs	
Buenos Aires, Argentina	0.552	0.448	0.378	299	0.800	0.200	40	Paraguay
Sao Paulo, Brazil	0.697	0.303	0.250	300	0.757	0.243	37	Paraguay
Delhi, India	0.752	0.248	0.119	310	0.813	0.188	32	Indonesia
Jakarta, Indonesia	0.723	0.277	0.167	300	0.895	0.105	38	Dubai
Amman, Jordan	0.840	0.160	0.070	300	0.792	0.208	24	Dubai
Kuala Lumpur, Malaysia	0.593	0.407	0.300	300	0.718	0.282	39	Dubai
Karachi, Pakistan	0.750	0.250	0.117	300	0.444	0.556	9	South Korea
Asuncion, Paraguay					0	1	13	
Singapore, Singapore	0.760	0.240	0.160	300	0.688	0.313	32	Indonesia
Johannesburg, South Africa	0.623	0.377	0.273	300	0.600	0.400	10	South Korea
Istanbul, Turkey	0.710	0.290	0.153	300	0.763	0.237	38	Bulgaria
Dubai, UAE	0.520	0.480	0.363	300	0.882	0.118	34	Dubai
London, United Kingdom	0.883	0.117	0.033	300	0.214	0.786	28	Belarus
New York City, United States	0.480	0.520	0.015	200				
Buffalo, United States	0.620	0.380	0.165	200				
Miami, United States	0.856	0.144	0.021	194				
Richmond, United States	0.915	0.085	0.000	200				
Charlotte, United States	0.850	0.150	0.010	200				

Table 2: IW and Marlboro Prices by City

City	Av. Price Marlboro (\$US)	Av. Price IW (\$US)	IW Brand Name (most popular)	IW Manufacturer
Buenos Aires, Argentina	2.85	0.32	Rodeo	Tabesa
Sao Paulo, Brazil	2.72	1.08	Eight	Tabesa
Delhi, India	3.24	1.75	Gudang Garam	PT Gudang Garam
Amman, Jordan	2.67	1.50	Manchester	JSS Limited
Karachi, Pakistan	1.25	0.54	Esse	KT&G
Singapore, Singapore	9.65	4.18	Gudang Garam	PT Gudang Garam
Istanbul, Turkey	3.79	1.52	Prestige	Bulgartabac
Dubai, UAE	2.72	0.29	Top Mountain	Unknown
London, United Kingdom	12.48	4.19	Fest	Grodno Tobacco
Jakarta, Indonesia	1.47	0.42	Luffman	Leaton Tobacco International
Kuala Lumpur, Malaysia	4.20	0.79	John	Unknown
Johannesburg, South Africa	3.20	0.83	Pine	KT&G

Table 3: Summary Statistics

	Obs	Mean	SD	Min	Median	Max
Discarded Pack Data: 4603 observations in 17 cities						
Legal share	4603	0.710	0.132	0.440	0.725	0.940
Nontaxed share	4603	0.290	0.132	0.060	0.275	0.560
IW share	4603	0.167	0.128	0	0.145	0.410
Point-of-Sale Data: 367 observations in 13 cities						
IW availability	367	0.733	0.443	0	1	1
IW price	269	1.294	1.191	0.27	1.03	4.4
City and Country Data: 18 cities						
Average IW price	12	1.450	1.366	0.291	0.952	4.192
Marlboro Price	18	5.047	3.707	1.25	3.515	13
Most sold brand price	18	6.788	3.730	0.83	6.43	15.66
All taxes	18	0.542	0.198	0.174	0.526	0.824
Other taxes	18	0.125	0.079	0.052	0.127	0.36
Tax stamps	18	0.778	0.428	0	1	1
Daily cigarette use rate	18	0.150	0.061	0.031	0.141	0.319
Corruption	18	0.445	0.190	0.16	0.515	0.7
Literacy	18	0.935	0.087	0.695	0.952	0.99
GDP per capita	18	34062	24902	4902	24258	84901
Physical inspection rate	18	0.112	0.125	0.013	0.047	0.5
FEZ count	18	3.556	8.965	0	1	39

Combined, our datasets encompass 18 cities. The discarded pack dataset excludes Asunción, and the point-of-sale dataset excludes the 5 cities in the United States. The average IW price comes from the point-of-sale dataset but excludes Asunción because it had no IW cigarettes.

Table 4: IW Availability Regressions

Regression type	Probit			
Dependent variable	IW indicator (1 if IW, 0 if not)			
Regression number	(1)	(2)	(3)	(4)
All taxes, % of total price	1.760** (0.859)	0.23 (0.700)	0.643 (0.884)	1.620* (0.868)
Tax stamp use	0.878 (0.556)	0.674 (0.411)		0.710** (0.324)
Daily cigarette use rate	1.947 (2.058)	6.886*** (2.269)	5.703** (2.788)	
Adult literacy rate	-2.652 (3.242)	-6.728** (3.114)	-4.424 (3.330)	
log(GDP per capita)	0.0801 (0.734)	0.985** (0.449)	0.387 (0.333)	
Corruption	3.388* (1.916)	3.555** (1.526)		3.748*** (0.995)
Physical inspection rate	-3.088*** (1.157)			-3.567*** (1.168)
FEZ count	0.0552** (0.027)			0.0524*** (0.011)
Constant	-1.151 (5.129)	-6.528* (3.445)	-0.43 (2.863)	-2.444*** (0.748)
Pseudo- R^2	0.181	0.1356	0.0689	0.172
Observations	361	361	361	361
Cities	13	13	13	13

*These regressions use the data from the point-of-sale dataset. We report the coefficients estimated of the probit regressions, with clustered (at the city level) robust standard errors in parentheses. All regressions include dummy variables to control for the type of establishment from which the cigarettes are purchased. Observations are probability-weighted to equalize the effective city-level weight. Significance at 10%, 5% and 1% is denoted by *, ** and ***.*

Table 5: IW Price Regressions

Regression type	OLS	OLS	OLS	OLS	OLS
Dependent variable	IW price				
Regression number	(1)	(2)	(3)	(4)	(5)
Price of most sold brand	0.0311 (0.0212)		0.0772** (0.0345)		
Price of Marlboro		-0.279*** (0.0308)		0.198 (0.1480)	
All taxes, fraction of total price	4.015*** (0.3880)	6.332*** (0.2490)			4.352*** (0.3180)
Tax stamp use	0.908*** (0.2060)	1.812*** (0.0864)			1.157*** (0.2020)
Daily cigarette use rate	-1.367** (0.6170)	-1.320*** (0.2570)	-0.129 (1.6550)	0.96 (1.5560)	-0.882** (0.3980)
Adult literacy rate	-4.067*** (1.1980)	-6.296*** (0.4420)	-1.146 (1.4610)	-3.320* (1.7950)	-5.046*** (0.9510)
log(GDP per capita)	-0.770*** (0.1800)	-1.031*** (0.0904)	-0.318 (0.2410)	-0.0026 (0.2640)	-0.758*** (0.1860)
Corruption	-8.602*** (0.5350)	-15.42*** (0.7860)	-8.027*** (0.9910)	-4.31 (3.9470)	-9.069*** (0.5410)
Physical inspection rate	-1.249** (0.4510)	-1.483*** (0.2310)	2.899*** (0.7880)	0.571 (1.7300)	-1.791*** (0.3940)
FEZ count	0.0237** (0.0104)	0.0376*** (0.0035)	-0.0393*** (0.0069)	-0.0393** (0.0135)	0.0264** (0.0102)
Constant	13.78*** (1.2450)	21.11*** (1.0050)	8.957*** (1.6590)	5.785 (3.5000)	14.61*** (1.3680)
Observations	264	264	264	264	264
Cities	12	12	12	12	12
R^2	0.99	0.997	0.96	0.958	0.99

*These regressions use the data from the point-of-sale dataset. We report the coefficient estimates with clustered (at the city level) robust standard errors. All regressions include dummy variables to control for the type of establishment from which the cigarettes are purchased. Observations are probability-weighted to equalize the effective city-level weight based on the number of IW cigarettes found in each city. Asunción is effectively excluded from the regression because we found no IW cigarettes in the city. Significance at 10%, 5% and 1% is denoted by *, ** and ***.*

Table 6: Regressions for Legal and IW Shares in Discarded Packs

Regression type	2SLS	2SLS	2SLS	2SLS
Dependent variable	Legal share	Legal share	IW share	IW share
Instrument for IW price ratio	All taxes	Other taxes	All taxes	Other taxes
Regression number	(1)	(2)	(3)	(4)
IW price ratio (instrumented)	0.764*** (0.1380)	0.586*** (0.0525)	-0.805*** (0.2790)	-0.412*** (0.0702)
Daily cigarette use rate	1.036*** (0.1510)	0.920*** (0.1440)	-1.305*** (0.3050)	-1.048*** (0.2470)
Adult literacy rate	-0.605*** (0.1590)	-0.473*** (0.1570)	0.967*** (0.2900)	0.675*** (0.2270)
log(GDP per capita)	-0.0361 (0.0300)	-0.0610** (0.0253)	0.0205 (0.0573)	0.0755** (0.0383)
Tax stamp use	0.0712*** (0.0232)	0.0500*** (0.0175)	-0.0860** (0.0397)	-0.0392 (0.0254)
Corruption	-0.386*** (0.1380)	-0.503*** (0.0767)	0.34 (0.2760)	0.598*** (0.1300)
Physical inspection rate	0.201*** (0.0674)	0.186*** (0.0588)	-0.159 (0.1260)	-0.125 (0.0860)
FEZ count	-0.000166 (0.0009)	-0.00108* (0.0006)	0.000321 (0.0015)	0.00234*** (0.0009)
Constant	1.418*** (0.2940)	1.676*** (0.2020)	-0.612 (0.5750)	-1.182*** (0.3110)
Observations	36	36	36	36
Cities	12	12	12	12

*These regressions use the data from the discarded pack dataset, and the price ratio from the point-of-sale dataset. The price ratio is the ratio of the IW price to the price of the most sold brand. Note that using the ratio of the IW price to the Marlboro price reduced the explanatory power (R-squared of 0.61) but does not significantly change the coefficient estimates. We report the coefficient estimates with clustered (at the city level) robust standard errors. There are three observations per city. Significance at 10%, 5% and 1% is denoted by *, ** and ***.*

Table 7: Smoker Survey Questionnaire and General Results

Hello, I noticed you're smoking, I'm doing a project for a research group on illicit tobacco and I wonder if I could have two minutes of your time to ask a few questions? The results will be published but your identity is not necessary.

Record Male or Female (411 observations)	
Male	65.2%
Female	34.8%
How old are you? (411 respondents)	
Under 25	34.1%
26-40	29.0%
41-55	22.1%
56+	14.8%
Where do you tend to buy your cigarettes? (411 respondents)	
Kiosk	8.3%
Pub/hotel	12.2%
Newsagent	12.2%
Gas station	40.2%
Grocery	14.4%
Tobacconist	10.7%
Online	2.2%
Other	(none)
Do you always buy the same brand? (411 respondents)	
Yes	64.2%
No	35.8%
Do you think tax/excise rates on cigarettes are fair? (88 respondents)	
Fair	12.5%
Too high	87.5%
Not high enough	(none)
Illicit cigarettes are primarily good quality cigarettes on which duty/tax has not been paid. Have you ever knowingly bought illicit cigarettes? (196 respondents)	
Yes	32.1%
No	67.9%
If so, why?	
“Cheap”	(38 people)
No response	(25 people)
Where did you buy these products, same place as before or different? (84 respondents)	
Kiosk	2.40%
Pub/hotel	35.70%
Newsagent	(none)
Gas station	3.60%
Grocery	(none)
Tobacconist	32.10%
Online	16.70%
Other	9.50%