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**TAXING & ZAPPING MARIJUANA:
BLOCKCHAIN COMPLIANCE IN THE
TRUMP ADMINISTRATION**

Boston University School of Law
Law & Economics Paper No. 18-03

Revised August 17, 2018

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TAXING & ZAPPING MARIJUANA:
BLOCKCHAIN COMPLIANCE & THE TRUMP ADMINISTRATION
(Part 1)

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On January 4, 2018, the Trump Administration through Attorney General Sessions rescinded an Obama-era policy¹ that discouraged federal prosecutors from bringing charges in all but the most serious marijuana cases under the federal Controlled Substances Act,² as well as under the Bank Secrecy Act.³ Federal law is at odds with state law in the majority of states on the legalization and subsequent state taxation of marijuana.⁴ Twenty-eight states and the District of Columbia have at least partially legalized marijuana. Eight of these states have legalized both medicinal and recreational use.⁵ With limited exceptions, legalized sales of marijuana are taxed.

¹ The Obama-era policy is contained in five Attorney General guidance documents (1) David W. Ogden, Deputy Att’y Gen., Memorandum for Selected United States Attorneys: Investigations and Prosecutions in States Authorizing the Medical Use of Marijuana (Oct. 19, 2009); (2) James M. Cole, Deputy Att’y Gen., Memorandum for United States Attorneys: Guidance Regarding the Ogden Memo in Jurisdictions Seeking to Authorize Marijuana for Medical Use (James M. Cole, Deputy Att’y Gen, Memorandum for All United States Attorneys: Guidance Regarding Marijuana Enforcement (Aug. 29, 2013); (3) James M. Cole, Deputy Att’y Gen., Memorandum for All United States Attorneys: Guidance Regarding Marijuana Related Financial Crimes (Feb. 14, 2014); and (5) Monty Wilkinson, Director of the Executive Office for U.S. Att’ys, Policy Statement Regarding Marijuana Issues in Indian Country (Oct. 28, 2014). These guidance documents have been rescinded.

² 21 USC § 801 *et. seq.* With this act, in 1970, federal regulation of marijuana began. Congress divided drugs into five categories. Marijuana was placed in the same category as heroin (Schedule 1). It was deemed to have “no acceptable medical use,” even though its medicinal value had been observed as early as 1839. (See the research paper by Irish physician, Dr. Walter O’Shaughnessy, *On the Preparations of the Indian Hemp, or Ganja* referenced further in *Cannabis Tinctures and Fluid-Extracts*, THE ANTIQUE CANNABIS BOOK, Ch. 4, available at: <http://antiquecannabisbook.com/chap4/Tincture.htm>. O’Shaughnessy brought tinctures back from India to the UK.

³ 18 USC §§ 1956-57, 1960; 31 USC § 5318. The BSA requires US financial institutions to assist US government agencies to detect and prevent money laundering. All marijuana transactions, as schedule 1 transactions under 21 USC § 801 *et. seq.*, are therefore money laundering transactions. Thus, the ABA observes:

All banks are subject to the requirements of the Bank Secrecy Act. Under the BSA, banks must report to the federal government any suspected illegal activity which would include any transaction associated with a marijuana business. These reports must be filed even though the business is operating legitimately under state law. ... Financial institutions face significant risk for violating EY Tax News Update for Thursday, January 18, 2018 (7:00 AM ET) federal law if they offer banking services to marijuana-related businesses.

ABA, *Marijuana and Banking, FAQ*, February 2014, available at: <https://www.aba.com/Tools/Comm-Tools/Documents/ABAMarijuanaAndBankingFAQFeb2014.pdf>

⁴ This paper does not argue for or against the legalization of marijuana. It is only concerned with the taxation of marijuana by the states, and efforts to prevent fraud and improve related trust issues among the US states. It also does not consider the federal income taxation of marijuana businesses. In this area there is considerable concern with IRC § 280 which prevents the deduction of expenses from income generated by the sale of cannabis. The only reductions from Gross Income allowed are related to the Cost of Goods Sold (COGS). For many taxpayers determining what expenses count as COGS, and what do not is hard to say. As a consequence, many individuals and businesses end up afraid to file their taxes and filings.

⁵ (1) **Alaska** [AS 43.61.010 & 15 AAC 61] (ballot measure 2, statute enacted November 2, 2014); (2) **California** [CA Code, Business and Professional Code, BPC §26000 *et. seq.* & Health and Safety Code, HSC § 11000, *et. seq.*; 11357, *et. seq.*; 11362.7, *et. seq.*] (Proposition 64, November 8, 2016, medical marijuana effective November 9, 2016, recreational marijuana legalized, effective January 1, 2018); (3) **Colorado**, [Colo. Const. Art. XVIII, §§ 14 &

We will consider this federal-state tax (and criminal enforcement) topic in a series of five papers. The first is introductory in nature. We examine the State tax and enforcement issues surrounding the legalized marijuana trade. Each of the other papers in this series will consider a specific marijuana fraud vector and present solutions to it.

Federal marijuana drug enforcement policy under the Obama Administration, created the space within which the states could legalize marijuana. Federal authority under *Gonzales v. Raich*⁶ and the interstate commerce clause broadly authorizes federal action. It permits granular federal enforcement of federal marijuana laws within any state, but the Obama administration limited these concerns and activities.

The now-rescinded AG memos declared that the federal interest in marijuana enforcement was not comprehensive. In particular, the memo by Deputy Attorney General Cole (August 29, 2013) limited the federal concern to:

1. Preventing the distribution of marijuana to minors;
2. Preventing revenue from the sale of marijuana from going to criminal enterprises, gangs and cartels;
3. Preventing the diversion of marijuana from states where it is legal under state law in some form to other states;
4. Preventing the state-authorized marijuana activity from being used as a cover or pretext for the trafficking of other illegal drugs or other illegal activity;
5. Preventing violence and the use of firearms in the cultivation and distribution of marijuana;
6. Preventing drugged driving and the exacerbation of other public health consequences associated with marijuana use;
7. Preventing the growing of marijuana on public lands and the attendant public safety and environmental dangers posed by marijuana production on public lands; and
8. Preventing marijuana possession or use on federal property.⁷

Staying clear of these eight problem areas seemed to assured the states that they could deal with marijuana as they saw fit. By reverse inference Cole's instruction to "all United States Attorneys," effectively was a request by the Attorney General that the states exercise tight and comprehensive *physical* [items 1, 3, 4, 7, & 8] and *financial* control [item 2] over all state-sanctioned marijuana transactions and their consequences [items 5, & 6]. With State success in

16 on medical and retail marijuana; C.R.S. §12-43.3-101 Colorado Medical Marijuana Code & CRS § 12-43.4-101 Colorado Retail Marijuana Code] (amendment 20 to Colo. Const., November 2000 & amendment 64 to Colo. Const., November 6, 2012); (4) **District of Columbia** (Initiative 59, 1998 medicinal; Initiative 71, November 4, 2014 recreational marijuana legalized and into full effect February 26, 2015, *but note* funding blocked by Congress); (5) **Maine** [7 MRS, Ch. 417 & 36 MRS § 1817] (Question 1, November 8, 2016); (6) **Massachusetts** [MGL Ch.94G] (Ballot Question 4, November 2016), (7) **Nevada**, [NRS 453A] (Ballot Question 2, November 8, 2016); (8) **Oregon**, [ORS Ch. 475B] (Ballot Measure 91, November 4, 2014); and (9) **Washington** [RCW 69.50] (Initiative 502, November 6, 2012).

⁶ 545 US 1 (2005) (involving agents of the Drug Enforcement Agency who seized and destroyed six marijuana plants being grown by two California residents for doctor recommended use to treat serious medical conditions under California's Compassionate Use Act).

⁷ James M. Cole, *Guidance Regarding Marijuana Enforcement*, (August 29, 2013) available at: <https://www.justice.gov/iso/opa/resources/3052013829132756857467.pdf>

these areas, the Federal government was willing to turn a blind eye to minor infractions of the federal law. Digital *track and trace* systems were created to meet this challenge.

Aside from “compassionate use” of medicinal marijuana, the States have seen real business development and job creation opportunities by legalizing the marijuana trade – estimates of 250,000 new jobs by 2020 are common.⁸ In addition, there is revenue to be generated by imposing income, sales and excise taxes on the marijuana trade. The revenue yield should be sizeable – estimates are of an annual \$28 billion in federal, state and local revenue from a mature industry; \$7 billion in federal revenue; \$5.5 billion in business taxes and \$1.5 billion in income and payroll taxes.⁹ For example, if marijuana were to be taxed with a federal excise tax in the same manner and at the same rate as tobacco, then federal revenue would increase by \$500 million annually.¹⁰ State revenue would increase many times more.

State marijuana revenue measures are not harmonized today. Both the tax rates and the commercial stages at which marijuana transactions are taxed diverge widely.¹¹ Rates range from

⁸ New Frontier Data, The Cannabis Industry 2017 Annual Report, available at: <https://newfrontierdata.com/annualreport2017/>; Debra Borchardt, *Marijuana Industry Projected to Create More Jobs than Manufacturing by 2020*, FORBES (February 22, 2017) available at: <https://www.forbes.com/sites/debraborchardt/2017/02/22/marijuana-industry-projected-to-create-more-jobs-than-manufacturing-by-2020/#637d43813fa9>.

⁹ Gavin Ekins & Joseph Henchman, *Marijuana Legalization and Taxes: Federal Revenue Impact*, TAX FOUNDATION: FISCAL FACT, No. 509 (May 2016) available at: https://files.taxfoundation.org/legacy/docs/TaxFoundation_FF509.pdf

¹⁰ *Id.* \$500 million is what Colorado raised in the first three years of legalization

2014 from 1-1-2014	\$76,152,458
2015	\$135,100,463
2016	\$198,522,164
2017 through 5-31, 2017	\$96,368,540
TOTAL	\$506,143,625

VS Strategies, *Colorado Exceeds \$500 Million in Cannabis Revenue Since Legalization* (July 19, 2017) available at: <http://vsstrategies.com/wp-content/uploads/VSS-CO-MJ-Revenue-Report-July-2017.pdf>

¹¹ (1) **Alaska** (wholesale tax imposed on sale from cultivation facility to retail store or manufacturing at \$50 per oz. on flower, and \$15 per oz. stems/leaves; medical use not taxed - <http://tax.alaska.gov/programs/programs/index.aspx?60000>); (2) **Arizona** (state retail sales tax on medical use marijuana at 6.6% with 2-3% optional city tax - <http://www.azdhs.gov/licensing/medical-marijuana/index.php#rules-statutes>); (3) **Arkansas** (state retail sales tax on medical use marijuana at 4% - <http://www.mmc.arkansas.gov>); (4) **California** (wholesale tax [cultivation tax] imposed on cannabis entering the commercial market at \$9.25 per oz. of flowers and \$2.75 per oz. of leaves [paid over to the distributor], in addition to the standard retail sales tax of 7.25% and 15% excise tax [collected from consumer by retailer, and paid over to the distributor] with an exemption from the 7.25% sales tax and 15% excise tax for medical marijuana - <http://www.cdtfa.ca.gov/industry/cannabis.htm>); (5) **Colorado** (wholesale excise tax is imposed at 15% on the first sale (transfer) from a cultivation facility to a retail store, and an additional 15% special state retail marijuana sales tax is imposed on sales to final consumers, however, medical marijuana is exempt from the 15% wholesale excise tax - <https://www.colorado.gov/pacific/tax/marijuana-taxes-file>); (6) **Connecticut** (imposing a \$3.50 tax per gram of medical marijuana when acquired by a Connecticut dealer - <http://www.ct.gov/drs/cwp/view.asp?a=1514&q=268546>); (7) **Delaware** (imposing no tax and only allowing medical marijuana - <http://dhss.delaware.gov/dph/hsp/medmarocreg.html>); (8) **District of Columbia** (imposing no tax on medical marijuana, and retail sales not allowed - <https://doh.dc.gov/service/medical-marijuana-program>); (9) **Florida** (medicinal marijuana sales allowed under the Constitutional amendment that was approved, and which assumed sales tax would apply, but Florida sales tax exempts prescription medications, thus the rate is TBD by 9 months after enactment date of June 30, 2017) (10) **Hawaii** (imposing a 4% excise tax on medical marijuana, and at

zero for medicinal use (in Delaware, DC, Maine, Massachusetts, New Hampshire, New Mexico, North Dakota, and Oregon) to roughly 47% (for recreational marijuana, slightly less for medicinal) in Washington.¹² The types of taxes imposed range from standard income, excise, and retail sales taxes (in most states), to wholesale taxes (Alaska, California, Colorado, Illinois, Nevada, Pennsylvania, and West Virginia). In California, distributors will collect state taxes from both the grower and the retailer. In some instances, the grower will pay taxes directly to the State on marijuana for the right to place it into commercial distribution (Rhode Island).

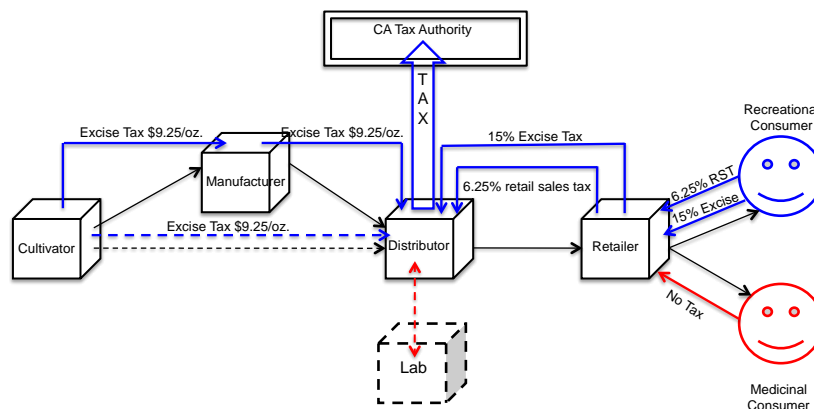
For the most part, state marijuana taxes cascade with excise taxes appearing in the retail sales tax base. In California, for example, an excise tax is imposed on marijuana flowers at

4.5% on Oahu, but recreational sales not allowed <http://health.hawaii.gov/medicalcannabis/>); (11) **Illinois** (imposing a 1% pharmaceutical tax on medical marijuana as an exception to the standard 6.25% sales tax in addition to a 7% cultivation privilege tax on the cultivation of medical marijuana - <http://www.revenue.state.il.us/LegalInformation/Regs/Part429/429-110.pdf>); (12) **Maine** (imposing no tax on medical marijuana, however a 10% tax is imposed on retail sales in addition to a wholesale tax of \$1.30 per pound of processed cannabis - <https://legislature.maine.gov/9419/>); (13) **Maryland** (imposing a retail sales tax, but rate, if other than the standard 6% rate, has not determined); (14) **Massachusetts** (imposing no tax on medical marijuana, however for recreational use the standard 6.25% sales tax applies in addition to a 10.75% excise tax and a local municipal tax of 3% - <https://www.mass.gov/medical-use-of-marijuana-program>); (15) **Michigan** (imposing a 3% excise tax on gross receipts of dispensaries in addition to the 6% state sales tax on medical marijuana - http://www.michigan.gov/documents/treasury/Tax_Policy_Newsletter_November_2016_544007_7.pdf); (16) **Minnesota** (imposing a \$3.50 per gram tax in medical marijuana - http://www.revenue.state.mn.us/businesses/controlled_substance/Pages/Tax-Information.aspx); (17) **Montana** (currently imposing a 4% sales tax until June 30, 2018 when it drops to 2% - <http://leg.mt.gov/bills/2017/billpdf/SB0333.pdf>); (18) **Nevada** (imposing a 2% medical excise tax, a 10% retail excise tax, and a 15% excise tax on wholesalers on the first wholesale sale by a cultivator - <https://tax.nv.gov/Forms/MMT/>); (19) **New Hampshire** (imposing no tax on medical marijuana, recreational use not allowed - <https://www.dhhs.nh.gov/oos/tcp/>); (20) **New Jersey** (imposing a 7% sales tax on medical marijuana, recreational use not allowed - <http://www.state.nj.us/treasury/taxation/pdf/pubs/tb/tb68.pdf>); (21) **New Mexico** (imposing no tax on medical marijuana, recreational use not allowed - <https://nmhealth.org/about/mcp/svcs/>); (22) **New York** (imposing a 7% tax on medical Marijuana, recreational use not allowed - https://www.tax.ny.gov/pubs_and_bulls/tax_types/med_marijuana_tax.htm); (23) **North Dakota** (imposing no tax on medical marijuana in proposed rules due in February 2018 (24) **Ohio** tax rate TBD after September 2018 when the Medical Marijuana Control Program is fully operational - <https://www.medicalmarijuana.ohio.gov>); (25) **Oregon** no tax on medical marijuana, but recreational is taxed at retail at 17% with 3% local municipal tax - <http://www.oregon.gov/DOR/programs/businesses/Pages/marijuana.aspx>; (26) **Pennsylvania** wholesale tax at 5% excise tax; (27) **Rhode Island** (imposing a \$25 per plant tag for patient/ caregivers on medical marijuana, a 4% surcharge paid by the seller, and the 7% regular sales tax - <http://webserver.rilin.state.ri.us/Statutes/TITLE21/21-28.6/21-28.6-15.HTM>; Emergency Regulation CCS 11-01 Compassion Center Surcharge at: <http://www.tax.ri.gov/regulations/other/CCS-01.pdf>); (28) **Vermont** (medical is exempt from sales tax, but pipes, vaporizers, and other items classified as drug paraphernalia sold in a dispensary are subject to the 6% sales tax, with local taxes at 1% in addition - (<http://tax.vermont.gov/sites/tax/files/documents/MedicalMarijuanaFS.pdf>)); (29) **Washington**; (imposing a 37% excise tax on medical marijuana sales, but providing an exemption from the standard state sales tax only for medicinal marijuana – however for recreational use the 37% excise tax applies in addition to state and local sales taxes) - <https://dor.wa.gov/find-taxes-rates/taxes-due-marijuana>); (30) **West Virginia** (imposing a 10% wholesalers excise tax - http://www.wvlegislature.gov/Bill_Status/bills_text.cfm?billdoc=sb386%20intr.htm&yr=2017&sesstype=RS&i=386)

¹² Washington State has a 6.5% retail sales tax, which can be combined with local city and county sales taxes. The total rate averages 10%. For example, in Seattle, located in King County, the aggregate rate is 9.6% with 6.5% going to the State, 2.7% going to the city of Seattle, and 0.4% going to the Regional Transit Authority. See: <https://dor.wa.gov/file-pay-taxes/file-or-amend-my-return/instructions-completing-combined-excise-tax-return/section-ii-state-and-local-retail-sales-tax>

\$9.25 per oz. (it is paid to wholesalers by growers). This tax is included in the base when the wholesaler sells on to retailers. These retailers, in turn, collect an additional 15% excise tax on consumer sales before the State’s 6.25% state retail sales tax is imposed (along with city and county sales taxes). Because the 15% and \$9.25 per oz. excise taxes are included in the retail sales tax base aggregate California taxes are much higher than they appear. See figure 1 (below).

Figure 1:
Taxes in the California Supply Chain



This paper proposes to analyze state marijuana enforcement and taxation through the lens of European value added taxes (VAT). There is a closer harmony between the EU and the US in this area than might be expected.

Cascading. The EU VAT was developed in response to the common use of cascading sales taxes on goods in the EU as they passed through supply chains. This is precisely what is happening in the US marijuana market.

Open borders. In both the US and the EU, there is an economic union comprised of semi-independent jurisdictions. Each jurisdiction has separate taxing authority to collect revenue from domestic consumption, based on the market value of the goods sold. In both cases, the internal borders of the community allow taxable goods to flow freely, without customs controls. In both the US and the EU this porous border invites criminal fraud.

Missing traders. The most notable fraud in both systems is “missing trader” fraud. This is a fraud whereby traders ship goods (in the EU) or marijuana (in the US) from low-tax/no-tax jurisdictions to high-tax jurisdictions. The supplies are sold *with tax*, followed by the “disappearance” of the seller. The State of Washington’s aggregate 47% transaction tax on marijuana is likely to attract criminal organizations nation-wide, just as Hungary’s 27% VAT does in the EU.

Inter-governmental trust. Open borders and heightened enforcement efforts inevitably create inter-governmental *trust* problems. In the US, high-tax jurisdictions (Washington) will ask low-tax jurisdictions (North Dakota) to help them stem illegal cross-border marijuana flows,

just as (high tax) Hungary often makes a similar request of (low tax) Luxembourg. States where marijuana sales remain illegal will be making criminal enforcement requests broadly.

Trust problems will arise in the US, just as they have in the EU. Revenue, business development, and employment concerns will all weigh against expeditious cooperation. This has been a continuing area of concern in the EU where trust among the Member States has been eroded by the burden of shared-enforcement obligations tethered to disproportionate benefit outcomes. The most recent proposals for change in the EU VAT strongly stress the use of technology to increase trust.¹³

There are also important *differences* between the EU and the US.

The EU - an idea-rich, but weak central government. The EU has a weak central government in tax matters. Brussels works hard to harmonize tax rules, reduce tax frauds, promote Member State trust, and shared tax enforcement, but it is hamstrung. The EU Council¹⁴ does not have taxing authority, and it is limited in its ability to otherwise affect tax changes among the Member States by Article 93 of the Treaty of Rome, which requires *unanimous* Member State consent before community tax laws are changed.¹⁵

The US - an idea-resistant, but strong central government. The US in contrast, has a strong central authority in tax matters. The Federal government can raise its own taxes. It plays a significant role in coordinating tax policy among the states both directly through the commerce clause, and indirectly through federal tax rules which are commonly adopted by the states.

¹³ Technology and trust are the themes of the most recent proposals for change in the EU VAT. COMMISSION STAFF WORKING DOCUMENT – IMPACT ASSESSMENT, *accompanying the document Proposal for a Council Directive amending Directive 2006/112/EC as regards harmonizing and simplifying certain rules in the value added tax system and introducing the definitive system for the taxation of trade between Member States*, SWD(2017) 325 final (October 4, 2017) at 11, 14 at n. 37, & 16 (emphasis added)

The efficiency of the VAT system needs to be further improved, in particular by exploiting the opportunities of *digital technology and by enhancing greater trust* between business and tax administrations and between EU Member States' tax administrations ... the preferred Option 2 notably relies on the assumption that the VAT due on a cross-border transaction in a given Member State is collected by another Member State that will also have the main responsibility for auditing the VAT due. This [new] system would, in practice, create a collective responsibility whereas under the then existing system each Member State was individually responsible for the administration, control and collection of its own VAT. *A high degree of trust* between Member States was therefore a pre-condition for the new system.

available at: <https://ec.europa.eu/transparency/regdoc/rep/10102/2017/EN/SWD-2017-325-F1-EN-MAIN-PART-1.PDF>

¹⁴ The EU Council is comprised of the Heads of State of the member States. The EU Commission, operating as a cabinet, would (in the normal course) recommend tax changes to the Council.

¹⁵ The Treaty of Rome established the European Economic Community (EEC) (later changed to the European Community). Signed on March 25, 1957. The Treaty has been revised many times, including the Treaty on European Union, signed in Maastricht on February 7, 1992, the Treaty of Amsterdam, signed on October 2, 1997, and the Treaty of Nice entering in force on February 1, 2003. Through all these changes the wording of the original Article 93 remained unchanged: the Council, "... acting unanimously on a proposal from the Commission and after consulting with the European Parliament and the Economic and Social Committee ..." shall adopt provisions for the harmonization of the VAT within the Community.

With respect to marijuana, however, the federal government has been more hostile than helpful. As a result, we have the unusual situation where the best ideas on how to build trust and increase the *enforcement* and *taxation* of marijuana may be found in Brussels, not Washington.

This paper considers operational EU VAT measures in tandem with cutting-edge proposals that lead to harmonization, information exchange, and enhanced enforcement, and applies them to the US. The proposals engage blockchain platforms, cryptocurrencies, artificial intelligence risk assessment, and highly secure real-time transaction records delivered to the tax administration. The measures offered are without question technology-intensive. However, in each instance they integrate well with the digital *track and trace* systems currently employed by US States to control legalized marijuana.

The first proposal is to place the central portion of the marijuana supply chain on a *private* blockchain that is shared among the states. Transactions in marijuana will be preserved in real-time (locally and centrally). Data will be shared among State authorities to aid enforcement, and tax collection.

The second proposal is for enhance retail security to prevent electronic sales suppression (ESS). Forms of ESS common in the retail trade include Zappers, Phantomware, Sales Suppression as a Service, and algorithmic off-shore Zappers in the Dark Cloud. Anti-ESS regimes are common in the major VAT jurisdictions. They are highly effective, exceedingly secure, and are the major defense against retail frauds. There is nothing comparable in the US, with the exception of a single secure installation in Seattle, Washington.

The third proposal is for a limited-purpose crypto currency. This would be a crypto-token like VATCoin that is digitally minted by the government. For example, CALCoin. CALCoin would be the *only currency* allowed for marijuana-related purchases within California. CALCoin transactions would be placed on a separate *public* blockchain. CALCoin(s), would be *available only from the State*, and would be *converted into fiat currency* or an alternate crypto currency *only by the State*.

The EU is considering versions of the first and third proposal and has adopted many versions of the second proposal. Progress toward adoption in the EU is always slow because of the constraints of Article 93.¹⁶ Two other economic communities have moved faster than the EU on the first and third proposals and have begun implementations. Implementations can be observed in the Gulf Cooperation Council (GCC).¹⁷ The first proposal is directly incorporated in *The Unified VAT Agreement for the Cooperation Council for the Arab States of the Gulf*.¹⁸ The

¹⁶ Personal e-mail communications with Theodoros Vassiliadis, Head of Unit, Taxation Systems and IT Compliance, Directorate General for Taxation and Customs Union, September 27 through November 15, 2017 in connection with Richard T. Ainsworth, Musaad Alwohaibi, Michael Cheetham & Camille Triand, *A VATCoin Solution to MTIC Fraud: Past Efforts, Present Technology, and the EU's 2017 Proposal*, TAX NOTES INTERNATIONAL (forthcoming).

¹⁷ The GCC is a regional intergovernmental political and economic alliance of six Middle Eastern countries – Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. It was formed in 1981.

¹⁸ Deloitte's Arabic/English bilingual replication of the GCC VAT Agreement is available at: https://www2.deloitte.com/content/dam/Deloitte/xs/Documents/tax/me_Deloitte-english-GCC-VAT-Treaty-translation-May-7.pdf. Also, Richard T. Ainsworth & Musaad Alwohaibi, *The First Real-Time Blockchain VAT: GCC Solves MTIC Fraud*, 86 TAX NOTES INTERNATIONAL 695 (May 22, 2017).

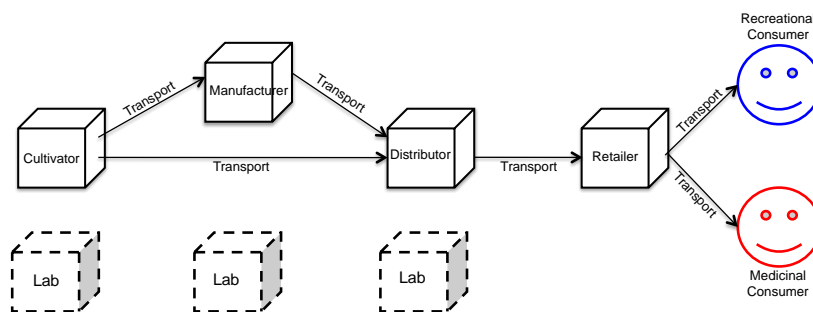
third proposal of a limited purpose crypto currency is under consideration in the EU as VATCoin.

One of the best examples of the full set of proposals can be seen in Rwanda.¹⁹ As a member of the East African Community (EAC),²⁰ Rwanda currently requires encrypted digital invoices (second proposal) collected centrally in real-time to block ESS with AI risk analysis applied to the data chain (first proposal), and is waiting for another EAC State to join it in a shared cryptotaxcurrency on an inter-jurisdictional exchange (third proposal).

MARIJUANA SUPPLY CHAIN

Figure 2 (below) presents the typical marijuana supply chain. The cultivator sells its yield either to a manufacturer (for example a bakery making brownies or cookies with marijuana ingredients), or directly to a distributor. The distributor purchases both the cultivator's and the manufacturer's output, then sells on to retailers who re-sell either medicinal or recreational marijuana to consumers. Any of the businesses along this supply chain may send the marijuana on hand to a third-party lab to verify quality, and may contract with a third-party carrier to deliver marijuana. Most of the other Figures in this series of papers will reference the format of this diagram.

Figure 2:
Standard Marijuana Supply Chain



States that have legalized marijuana have two concerns with the standard supply chain. Both concerns harken back to the Cole memo, as the states are responding to the risk of federal enforcement. The legalization of marijuana burdens states with the responsibility of (a) monitoring the *physical flows* of marijuana through the supply chain (making sure the marijuana does not enter inter-state commerce; making sure it stays out of the hands of minors, etc.), and also (b) monitoring the *fiscal flows* (making sure the proceeds of marijuana production do not end up in criminal hands).

¹⁹ Richard T. Ainsworth & Goran Todorov, *Stopping VAT Fraud with DICE – Digital Invoice Customs Exchange* 72 TAX NOTES INTERNATIONAL 637 (November 18, 2013) (discussing the initial stages of the solution, the adoption of digital invoices which are encrypted, digitally signed, preserved locally and sent centrally in real-time, but without the blockchain element).

²⁰ The EAC is a regional intergovernmental political and economic alliance of six East African countries – Burundi, Kenya, Rwanda, South Sudan, Tanzania/Zanzibar and Uganda.

The first burden arises because of the Controlled Substances Act, and is based on federal authority to regulate inter-state commerce. The second burden is brought about by the Bank Secrecy Act, and federal authority to control money laundering. We will consider both of these monitoring responsibilities throughout this five-paper series.

Monitoring Physical Flows

The states that have legalized marijuana need to closely monitor the *physical flows* in authorized supply chains. The states need to know that legalized marijuana is staying within the chains (within the state) – not leaking out. The type of physical controls favored by the states are *track and trace* (TAT) systems, or sometimes *seed-to-sale* (STS) systems.²¹

TAT and STS systems are complex, technology-based control systems. There are questions about whether they are adequate to the enforcement needs of the state. TAT is a derivative application of commercial inventory control systems. Radio Frequency ID (RFID) is applied.²² STS is a derivative application of Artificial Intelligence (AI) and Internet of Things (IoT). It comes from the application of technology to “digital food production.”²³ Neither TAT nor STS fully satisfy the enforcement needs of the State. Simply stated, these systems leak at both ends, and in the middle.

Under TAT and STS each marijuana plant under cultivation is specifically identified (digitally tagged), and then followed. Tracing includes movements within a cultivator’s establishment, carriage by third-party transporter along the supply chain, and movement in and out of every lab where the marijuana is sent for external testing. California, Colorado, Oregon, Alaska, Maryland, Michigan, Massachusetts, Montana, Ohio and Nevada use the METRC²⁴ system. METRC was developed by Franwell Inc., and is based on RFID technology.²⁵ Tagging with bar codes (as opposed to RFID chips) is an alternative, less efficient and less effective method of tracking.²⁶ METRC is the dominant provider in the legalized marijuana market.

²¹ *Seed-to-sale* (STS) software is sometimes required by State law to track marijuana in the commercial chain, but it also provides valuable data to cultivators about plant yields, cultivation method successes and failures, forecasting productivity, or assessing the effectiveness of extraction methods. Track and trace (TAT) software provides regulator tools to assess aggregate compliance data from all licensed businesses in the cannabis chain of custody. MJ Freeway, *Track and Trace vs. Seed to Sale*, (June 19, 2016) available at: <https://mjfreeway.com/blog/track-and-trace-vs-seed-to-sale>

²² RFID inventory control is just now achieving commercial success. Wal-Mart’s adoption of RFID twenty years ago is recognized as an expensive premature failure that has been overcome. See: Barbara Thau, *Is the “RFID Retail Revolution” Finally Here? A Macy’s Case Study*, FORBES (May 15, 2017) available at: <https://www.forbes.com/sites/barbarathau/2017/05/15/is-the-rfid-retail-revolution-finally-here-a-macys-case-study/#633add5f3294>; Matthew Malone, *Did Wal-Mart Love RFID to Death?* ZDNet (February 14, 2012) available at: <http://www.zdnet.com/article/did-wal-mart-love-rfid-to-death/>

²³ Two applications of AI and IoT (a Malthouse that regulated higher starch and proteins content, thus higher alcohol content downstream, and a more complex [138 variable] application to Medical Marijuana cultivation) are presented by Rob Dolci, *IoT Solutions for Precision Farming and Food Manufacturing*, 2017 IEEE 41st Annual Computer Software and Applications Conference 384.

²⁴ METRC is the name of the Franwell system, but it is also a descriptive string of words, functioning as an acronym meaning Marijuana Enforcement Tracking Reporting Compliance.

²⁵ Franwell Inc. explains the METRC process at: <https://www.metrc.com/the-system>.

²⁶ There are a number of commercial advantages to using RFID over bar codes. They include (1) read distances – a whole room can be read with RFID at 10 to 15 foot distances without touching the plants; (2) read speed – RFIDs

Track and trace systems are based on **daily** inventory measures reported to the state. METRC takes inventory with RFID tags. The METRC tagging process is sketched by Franwell, in ten steps.²⁷ Steps 1-5 occur during cultivation; step 5(a) is the direct sale to a Distributor; step 5(b)-7 is the direct sale to a Manufacturer, or an “infusing” enterprise followed by a re-sale to a Distributor; step 8-9 is the sale to a Retailer; step 10 is the sale to the final consumer. As a marijuana plant moves through the supply chain it will be identified within one or more of these step-points.

There are four “RFID tagging events” in the standard METRC schedule. METRC explains the ten inventory steps, and the four “tagging events” as follows:

1. *Immature plants* are grouped and identified by the grower;
2. *Vegetative plants* (8 inches, or in a 2-inch pot) are *tagged (first) with a discrete RFID tag*;
3. *Flowering plants* (light cycle of 12 hours on/ 12 hours off);
4. *Harvested plants* are cut down, and a “wet weight” is secured;
5. Marijuana is grouped by strain (buds or shake) *gets a new (second) unique RFID*. The product is now either:
 - a. Packaged and sold; or
 - b. Processed into hash, or infused in another product
6. Packaged product may be transferred to an infusing business
7. An infusing business will repackage the infused products for transfer, and will attach *a (third) unique RFID chip*;
8. Packaged inventory is transferred to a retail selling business;
9. Selling business will repackage inventory which is destined for another selling or infusing business. *A (fourth) unique RFID is attached*;
10. Retail selling business will sell to consumers from inventory.

In figure 3 (below) the four “RFID tagging events” are represented by letters “a,” “b,” “c,” and “d.” These figures are placed inside small boxes (to represent the “tagging” process.) A unique RFID is needed every time a product is transferred from one entity to another in the supply chain. *Daily* inventory counts are taken using the RFID chips within each entity, as well as by every transporting entity.

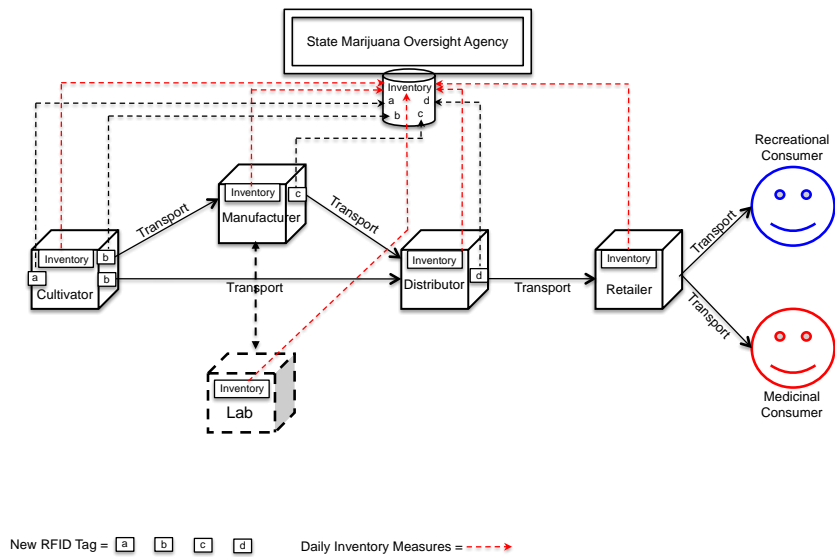
Each of the major software providers in the legalized marijuana market works in a similar fashion.²⁸ They strive to become the (only) State-authorized software for the collection of compliance data at the taxpayer level. In addition, they provide back-end software that operates the State’s web-portal.

are read 90% faster than barcodes; (3) RFIDs easily identify a single misplaced plant in a room; (4) errors with barcoding can require the inventory to be started from the beginning, whereas RFIDs simply require a second pass to be made of a room.

²⁷ The Franwell steps are an expanded version of the traditional commercial supply chain. Franwell expanded it to isolate the various places in cannabis growth and distribution cycle where RFID chips are attached. Several times different RFID chips can be attached to a product while it is in the hands of a single member of the supply chain.

²⁸ MJ Freeway’s Leaf Data System and BioTrackTHC are the other major providers.

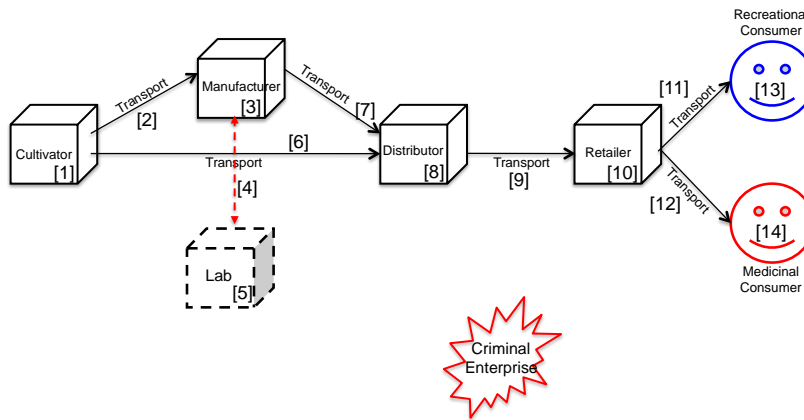
Figure 3:
RFID attachments & Daily Inventory measures under METRC system



State enforcement should not be held captive by the available TAT or STS solutions. It is problematical to consider the State’s job “done” simply by assessing how well a chosen TAT or STS performs. States need to consider enforcement in an honest, independent manner. From this perspective, it is reasonably clear that there are fourteen points along the standard marijuana supply chain where there may be “leakage” into the hands of criminals, or unintended consumers (minors or cross-border residents). The ultimate goal of any State system is not to simply to follow METRC or another TAT or STS system, but to use every measure to securely monitor and plug up each of these *leakage points*.

Figure 4 (below) numbers the likely *leakage points* in a marijuana supply chain. The great majority of these points, [2] through [12], are covered by METRC. There are serious problems with basic coverage at both ends of the supply chain – at [1], [13], and [14]. But there are also vulnerabilities within the main part of the chain, [2] through [12].

Figure 4:
14 marijuana *leakage points* in the Standard Marijuana Supply Chain



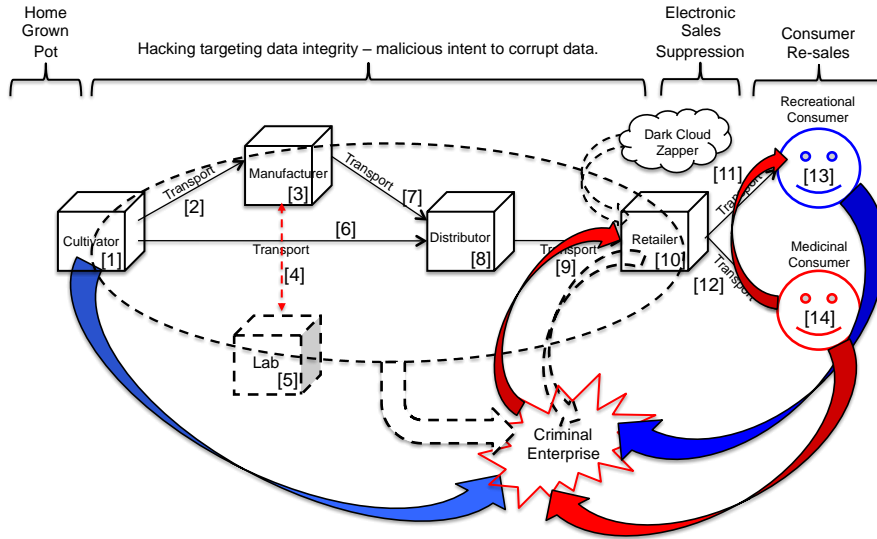
FRAUD DYNAMICS

There are four basic fraud opportunities for criminal organizations seeking to exploit the standard marijuana supply chain. Criminal attacks can be:

- Front-end frauds – exploiting openings at point [1];
- Cyber-attacks on the main commercial chain – producing leaks at points [2] through [12];
- Sales suppression fraud – exploiting insecure transactions at point [10]; and
- Back-end frauds – exploiting illegal re-sale opportunities at points [13] & [14].

We will develop these frauds and explore their prevention in sequence. By and large, the prevention mechanisms (with the exception of the first) have been developed and perfected in VAT regimes. The reason is simple. Government monitoring of VAT compliance and government monitoring of the marijuana supply chain both involve securing accurate records of transactions as goods pass among multiple unrelated entities in close to real-time. Fraud prevention comes from rapid risk assessment and near immediate detection of unrecorded or illegal transfers. The following diagram (Figure 5) summarizes the fraud vectors in the basic marijuana supply chain.

Figure 5:
 Fraud Vectors in METRC-protected Marijuana Supply Chains



This diagram, and a large portion of the discussion that will follow in subsequent papers presumes the METRC system is used to monitor marijuana flows, but the same analysis would apply just as easily if another *track and trace* or *seed-to-sale* regime, like MJ Freeway, was used.