Probable Causation, Episode 53: Heyu Xiong

Jennifer [00:00:08] Hello and welcome to Probable Causation, a show about law, economics, and crime. I'm your host, Jennifer Doleac of A&M University, where I'm an Economics Professor and the Director of the Justice Tech Lab.

Jennifer [00:00:18] My guest this week is Heyu Xiong. Heyu is an Assistant Professor of Economics at Case Western Reserve University. Heyu, welcome to the show.

Heyu [00:00:25] Thank you for having me. This super exciting. It's great to be here.

Jennifer [00:00:28] So today we're going to talk about your research on how legalizing marijuana affected the criminal activity of former marijuana dealers. But before we get into that, could you tell us about your research expertise and how you became interested in this topic?

Heyu [00:00:41] Sure. In terms of my research expertise, I'm an applied micro economist with fairly broad interests. My research spans several different fields, including the economics of media and digitization, economics of human capital and education, as well as crime. One common theme of my work is using historical evidence in order to shed light on policy relevant questions today. And it's a historical perspective, an approach that actually brought me to this particular topic in a very roundabout way. So when I was in graduate school, I was interested in working on an economic history project regarding the effect of national prohibition. The national prohibition was a fascinating policy experiment at the culmination of the temperance movement, where the federal government criminalized the sale and production of liquor and alcohol nationwide. So this is obviously a widely studied historical episode.

Heyu [00:01:25] My particular interest in the topic was understanding the effect of prohibition on individuals who worked in the brewing and distilling industry. So, in other words, in the alcohol and liquor industry. So brewers and distillers are- this is a very skill intensive trade. And these were presumably individuals who had built up a tremendous amount of human capital that was specific to the alcohol and liquor industry. So I was curious about their labor market outcomes when their specialization was rendered obsolete by the policy change and these individuals were effectively displaced from their job. So this question is motivated by the kind of large literature in labor economics, studying the effect of job loss and job separations. Much of that literature kind of in recent years has focused on the manufacturing industry. And these papers typically follow worker experience after involuntary job separation in order to understand the cause of job loss.

Heyu [00:02:12] So I was interested in exploring that question in a historical setting. So long story short, the project actually did not turn out to be very successful and kind of died on the blinds. But along the way, I had been aware peripherally of the changing legal landscape of marijuana and the ongoing process of marijuana legalization, which was occurring then at an increasing pace. I think one day just occurred to me that there was a very interesting parallel between the two situations. Now, whereas criminalization and prohibition might displace individuals in the legal sector, legalization may have similar destabilizing and destructive effects on the criminal labor market. And it struck me that we knew relatively little about career progression or job loss in informal and criminal labor market, despite the fact that many people participated in the illegal sector or the informal sector. So I became kind of genuinely curious about what happens to marijuana dealers now that marijuana has been legalized. So that's kind of how I decided to work on this

project, studying specifically the effect of legalization policies on black market participants and focusing on the effect of marijuana legalization on the criminal and labor market activity of established marijuana dealers.

Jennifer [00:03:20] That's so interesting, I love hearing paper backstories. So your paper here is titled, "Displacement in the Criminal Labor Market: Evidence from Drug Legalizations." And in it, you consider drug dealing as a skilled profession like any other. So give us some background. What do we know about how this labor market operates?

Heyu [00:03:37] That's a great question. So I guess the central challenge to study crime is that, you know it's very, by its nature is hard to observe and difficult to gather from data. So the information we do have about the criminal labor market is obviously very limited. Based on the studies and reports I have read, it seems like the black market for marijuana at least relies on a pretty sophisticated supply chain. Upstream, there are growers, planters, and traffickers, and wholesale distributors. And further downstream, there's the retail side of the business, which is a very labor intensive. So these are essentially street dealers. And it's really kind of these individuals that I focus on in my paper, in my project, because this is the more labor intensive side of the business. Ethnographic studies indicate that most marijuana street dealers are effectively self employed and work for themselves. They function as independent contractors.

Heyu [00:04:23] And, you know, within the economics, my paper is not the first to take seriously the notion that there is human capital in the commission of crime and these human capital could be, in fact, very specific or very sophisticated. For instance, there's a previous paper that show individuals entering incarceration- there is significant peer effects and they often learn from individuals they are incarcerated with on how to commit further crime. There's also other papers that show that when individuals are exposed to narcotics trafficking in their childhood, that has significant effect on their future criminal activity. There's other paper that also show using NLSY data that kind of linked drug sales to legitimate self employment. So I guess from these papers, there is kind of an indirect evidence that show that there is a transferable skill set involved in drug selling.

Jennifer [00:05:12] And in recent years, as you mentioned, some states have legalized marijuana, which, of course, had previously been illegal. So which policy changes do you consider in this paper?

Heyu [00:05:21] Right. So the policy changes I study are full recreational legalization. So these are somewhat different from previous attempts to reform marijuana policy. That includes kind of depenalizations or decriminalization policies. Because when states fully legalize recreational marijuana, there's often attempts to regulate and sanction the commercial legal production and sale of marijuana for recreational purpose, therefore effectively creating legal competition for illicit suppliers and potentially disrupting the black market. So that's why I focus on full recreational legalization as opposed to medical legalization or simply decriminalization of consumers.

Jennifer [00:05:56] And which states are you focusing on here?

Heyu [00:05:59] Right. So I focus on three states that legalize marijuana relatively early. So Colorado, Washington and Oregon.

Jennifer [00:06:05] And what years did they legalize?

Heyu [00:06:07] Colorado and Washington both passed the legislation to legalize marijuana in 2012 and legalization was effectively implemented in 2014. And Oregon legalized slightly later in 2015.

Jennifer [00:06:21] Great. OK, and what had we previously known about the effects of marijuana legalization more broadly?

Heyu [00:06:25] That's a great question. There is kind of a substantial literature, prior to my study, there was already a substantial literature in studying the effect of legalization. And there's a lot of dimensions to consider when one is to understand the effect of legalization, broadly speaking. So there is a strand of literature that study the effect of legalization on demand and consumption. But there is also substantial interest from researchers and policymakers alike on the relationship between legalization and crime. And prior to my paper, there was already existing literature on that topic. However, those papers tend to focus on what is the effect of legalization on crime rates within the precinct, a district, a city, or state that legalizes a drug.

Heyu [00:07:04] So my focus was a little bit different. Rather than focusing on overall crime in an area I was more interested in the individuals that were engaged in the crime themselves. And this distinction is important because legalization can affect crime in the locality through a variety of causal channels and different mechanisms. For example, it could be there is change in the composition of the city because of migration, or it could be there is changing criminal behavior by the end user. And I was more interested in what happened to established marijuana dealers. So the focus on criminals rather than localities as a unit of observation, I guess my research tries to answer two interrelated questions that I think was not addressed by the existing literature, which is does legalization disrupt illicit markets? And second, what are the consequences of displacement for those individuals who are displaced?

Jennifer [00:07:49] Yeah. So in your paper, you're considering what happens on the supply side, we could say. So that is what happens to people who had previously been selling marijuana in the black market. And I bet that many people listening to this will think the answer is obvious. These policy changes now make the work of selling marijuana legal. And so we should see marijuana dealers simply integrate into the legal labor market and commit less crime. But the insight you bring to this paper is that there are other ways this could play out. So what are the mechanisms you have in mind for how legalizing marijuana might affect those who had previously made a living selling marijuana illegally?

Heyu [00:08:23] Exactly. I think on its face, you might think the answer to this question is rather obvious. And I think maybe sometimes we take for granted the notion that there is a binary choice between committing crime or not committing a crime. And once you legalize marijuana, individuals simply return to the legal sector. In actuality, I think it's very possible that individuals who are embedded in illegal marijuana dealing develop human capital and social networks that are very specific to the illicit drug trade. And it's unclear how transferable those skills are to the legal sector. For instance, once marijuana becomes legalized and there's legal entrants, it's unclear whether if you were proficient at selling drugs illegally, whether you will be competitive as a legal retailer. The skill sets required to operate a full legal business might be very different than a skill set that was necessary to operate an illegal business. Furthermore, there was also- in states that legalized, there were often barriers set up to prevent individuals with criminal records from obtaining a license in order to operate a marijuana dispensary. Therefore, individuals who dealt marijuana illegally could not readily just simply become a legal distributor, if you will.

Therefore, what happens to these individuals is far from clear. And actually one of the central findings of the paper suggests that an unintended consequence of selective legalization was a reallocation of these former marijuana dealers to other illicit activities. So rather than returning to the legal sector, the legalization of marijuana actually induced the escalation of criminality and pushed these individuals to be- to the trafficking of other drugs.

Jennifer [00:09:55] So their skill set, their human capital wasn't necessarily in marijuana. It was in the illegal drug trade or how to operate in the black market. Am I getting that right?

Heyu [00:10:03] That's exactly right. And that's that's something that was consistent with what I find in the paper.

Jennifer [00:10:08] Yeah. So why didn't we know more before this paper about what happens in practice? What are the challenges that you had to overcome in order to measure the causal effect of marijuana legalization on criminal behavior?

Heyu [00:10:20] When I sat down and started kind of thinking about and trying to conceptualize how I could operationalize the idea, it was not so straightforward. As I mentioned, crime by its very nature is clandestine and hard to observe. So there's not readily available information on the activity of marijuana dealers, for instance. So when I kind of sat down and first started thinking about the topic, the ideal experiment I think, would be if we were able to randomly assigned marijuana dealers to different legal regions and able to observe them over time and observe their activities and- the, kind of, criminal and labor market activities over time. Obviously, that's not a really feasible experiment for us to run. So in order to approximate this ideal experiment, what I exploit is the fact that marijuana offenders, individuals who are convicted of marijuana sales and distribution, are being released from prison at different points in time and within within a narrow enough time window, we could think of their timing of release as good as random. So essentially, I compare marijuana dealers who are being released from incarceration before and after the legalization of marijuana. And I track these individuals to observe where there's differences in their future criminal activities.

Jennifer [00:11:27] And you're using policy changes again in Washington, Oregon, and Colorado as natural experiments to measure the effects on marijuana dealers. So you're comparing people who are released just before and after these policy changes. I think you also have a comparison group or two or three that you use to make sure that you're isolating the effect of legalization. So tell us a little bit more about your approach here and the intuition of what you're doing.

Heyu [00:11:51] So maybe I should first talk about the outcome, the main outcome variable I look at, which is whether individuals essentially return to prison after a certain amount of time. So the main outcome I focus on is recidivism—so whether individuals who are released from prison commit crime in the future and whether they return to prison or not. As I mentioned, it's very difficult for us to observe criminal activity. So we need to rely on data that's collected by law enforcement. And recidivism is one such measure. I think of recidivism as a kind of a measure of participation in criminal activity. So essentially, I compare marijuana offenders who are released from prison after legalization, observe whether there's changes in their risk of recidivism compared to their counterparts who were released prior to legalization.

Heyu [00:12:33] However, one concern you might have is that there could be changes in law enforcement or policing that coincide with the timing of the policy change. So, for example, it could be that after legalization, there is greater—because the state is able to kind of tax marijuana sales and receive greater tax revenue—this might lead to more investment into policing and therefore more cops on patrol and therefore the arrest rates for drug dealing goes up. That would result in a change in recidivism, even though there is no underlying changes in criminal activity. So in order to address these concerns, I use other criminals released in the same states before and after legalization as a control group. So identifying offenders that were convicted of crimes other than marijuana legalization, other than marijuana sales and distribution, and observe whether there was a change in risk of recidivism for those groups. And one especially compelling control group that I use is individuals who were arrested and convicted of sale and distribution of other drugs. So, for example, narcotics or other harsher substances. And I'm able to use those drug dealers as a control group for the treated group of marijuana offenders. And what I find essentially is that there is no change in risk of recidivism for for other offenders in these states. However, the headline result is that there is a dramatic rise in the risk of recidivism for marijuana offenders, specifically.

Jennifer [00:14:04] Great. And what data are you using for all of this?

Heyu [00:14:07] Yeah, that's a great question. Well also one of the, I mean, one of the challenges in this project was getting access and finding the appropriate data to implement this analysis. And what I use as a dataset is actually collected by the Bureau of Justice, of National Corrections Reporting Data. And I use a restrictive version of this dataset, which contains very detailed information about what crimes individuals were convicted of. So this is a dataset that tracks the incarcerated population over time. And the data includes a unique identifier that allows me to track individuals from one incarceration episode to the next. And that lends itself to be- for me to be able to kind of measure their recidivism over any specified duration or time period. So this is a data that that I use primarily in my analysis.

Jennifer [00:14:55] And this is a relatively—just an aside for folks who are curious—this dataset is relatively new. I mean, it first became available a few years back and it was just like completely groundbreaking and changed everything. Like you could actually measure recidivism for a sample that looked like the national sample. So it's really neat to see papers like this taking advantage of that. I guess the one caveat with this dataset is if people move across states, you can't see it. Right? So it's still like- you can link people over time within a state, which is amazing because it wasn't possible before, but if someone moves from, I don't know, Colorado to Nevada or something, then they disappear.

Heyu [00:15:32] That's exactly right. So the data was collected, I guess, at a state level from the corrections departments. So the unique identifiers in the data, unfortunately, only allows me to track individuals from within the state from one conviction to the next. So this is one of the limiting factors of the study for sure. So if individuals, for example, commit a crime in a different state, they will simply show up as having not committed a crime at all.

Jennifer [00:15:53] Right. Limiting factor. Nice, good to mention, but also probably not that big a deal, given that people tend to be on parole or something when they come out of prison and can't move that far. And then in general, we think people don't move all that much. OK, so let's talk about the sample then. So what do those who have previous marijuana convictions look like? Tell us a little bit about them.

Heyu [00:16:13] Right, so, crucially, the data, the restricted version of the data allows me to identify individuals who were convicted specifically for the delivery, sale, or manufacture of marijuana, as opposed to distribution of any of other drug or commission of any other crime. And also, I distinguish that individuals who were convicted for sales and distribution from possession charges as well. And based on kind of the demographics information, the marijuana offenders, marijuana dealers differs from overall population offenders in three primary respects, I would say. They're significantly younger. They serve, on average, shorter sentences, about a year and a half. And they are also significantly less likely to have violent criminal history.

Jennifer [00:16:51] And you mentioned that the main outcome measure you're looking at here is recidivism. How do you define recidivism?

Heyu [00:16:56] So I define recidivism over two different time periods. I look at recidivism over a pretty short time period overall. And I look at it over the period of six months after release as well as 12 months afterwards. And the reason I focus on such a short time period, it's because the amount of time I considered kind of creates a tradeoff in the study design. So for me to have comparison groups that are apples to apples, to individuals who are released after legalization, I must consider the individuals who were released early enough prior to legalization, who spent their entire time period post release under one legal regime. So when you consider recidivism within six months of release, my comparison group, my control group—the prior to treatment group, if you will—are individuals who were released up to six months before legalization. And when I consider recidivism within 12 months of release, I moved that time window a little bit forward and consider individuals were released up to 12 months before legalization.

Jennifer [00:17:52] OK, so six month and 12 month recidivism and recidivism here means reincarceration? Is that right?

Heyu [00:17:58] That's right. So it's whether I observe individuals back in prison or not.

Jennifer [00:18:03] Back in the data. Yep. All right. So let's talk about the results then. So what do you find is the effect of legalizing marijuana on the subsequent recidivism of those with histories of selling that drug?

Heyu [00:18:14] Yeah. So the headline results, I suppose, are I find that the legalization, it's associated with a significant increase in the risk of recidivism among marijuana offenders. And the increase is is large and significant. It's around 10 percent at a six month period and up to 13 percent over the period of 12 months. And this represents a near kind of 100 percent increase from the baseline recidivism rate. So I find a really dramatic rise in recidivism amongst this group.

Jennifer [00:18:44] And what types of new offenses are driving this overall increase in recidivism? What are people doing that's getting them into trouble?

Heyu [00:18:50] That's exactly what I look at next. I think of this as kind of like a really puzzling result, you know, you're legalizing the crime. Yet I find the criminality of a group has increased. So in order to kind of unpack what I think is a puzzling finding, I decomposed the outcome variable and look more closely at what type of crime has been committed that causes individuals to return to prison. And I find the increase in risk-recidivism masks two countervailing effects. So first, marijuana offenders actually became

significantly less likely to commit future marijuana distribution crimes. So I think of this as evidence that legalization did, in fact, disrupt the black market and essentially drove these individuals out of the illegal sales of marijuana. However, I find that the decrease in the marijuana offenses are offset by an increase in the distribution of other drugs. So I find the increasing risk of recidivism is entirely driven by distribution of non marijuana related drugs. While on the other hand, there's very little increase in the risk of committing property crimes or any other crimes as well. So the entire rising recidivism is driven by the substitution towards the distribution of other drugs.

Jennifer [00:20:01] And I think you note in the paper that the effect on marijuana recidivism and the fact that these people are not being re incarcerated for marijuana sales, isn't just mechanical, it's not just selling marijuana is now legal because it has to be within one of these distribution centers or dispensaries or something like that. Am I remembering that correctly?

Heyu [00:20:21] That's exactly right. So when states legalize, the sale and the commercial sale of marijuana is still highly regulated. It's not that you could simply sell marijuana on the street without a license from the government with without worrying about, without recourse. You have to receive a license and you have to be able to sell marijuana legally. So I don't think of the decline in the risk of selling marijuana as simply being a mechanical effect.

Jennifer [00:20:45] But it's probably just less profitable. Is that how you're thinking of it?

Heyu [00:20:49] Right. So that's exactly something I actually try to provide evidence on as well. So in order to kind of understand the mechanisms that are driving the results, I collect data on prices and primarily on the prices of marijuana at the transaction level. Essentially, I scrape data from this website called priceofweed.com, which is a website that essentially tries to crowdsource the street price of marijuana by having users submit the prices from transactions they have actually made. And when using this dataset, what I observed is that after the effective legalization date, which I always considered to be the day that the first recreational dispensary opened, there is a significant decline in the street price of marijuana. And perhaps more interestingly, I also find there is a decline in the variance or the price dispersion within the state, indicating that perhaps after marijuana becomes legalized, the search costs on the side of consumers has decreased. So consumers are able to better find and essentially the market has become more competitive over time. And these are consistent with the idea that the profits available to illegal dealers should be reduced. I also further find that legal vendors, legal dispensaries are entering precisely in neighborhoods where illegal trade used to happen. So within cities such as Denver and Portland, for instance, the neighborhoods where most dispensaries open are precisely the locations where marijuana possession arrests happened prior to legalization. So at least from a geographical perspective, there is definitely evidence in favor of the idea that the legal entrants are spatially displacing the illegal trade.

Jennifer [00:22:26] OK, so you've got two similar people who both go to prison for selling marijuana. One happens to get out while marijuana is still illegal. And the next the other person happens to get out just after it's legalized. And what you're finding here is that the person who happens to get out just after marijuana is legalized now is less likely to go back to prison for selling marijuana. But he's more likely to go back to prison for selling cocaine or something like that instead. So then you do a bunch of kind of additional analyzes to dig into this, which I found super interesting. So you consider whether the effects of legalizing marijuana are bigger or smaller in places where transnational drug

trafficking organizations are known to operate. So tell us why you do this and what you find.

Heyu [00:23:14] Yeah, these are some analyses I've kind of minimized more in the most recent version of the paper at the request of the referees. But this is something I did investigate kind of early on as well, because even though I'm treating kind of a marijuana dealers as independent operators, obviously the drug trade in the United States is in a sense organized, right. There are larger organizations that control the business. And I wanted to kind of see whether the effect that I find in the transition of individuals, of former marijuana dealers to other drugs, differed depending on whether there is large organized drug trafficking organizations that operate in the area or not. And I did find that it seems like there is greater increase in the risk of recidivism when a drug trafficking organization were active in the location, indicating that perhaps these organizations are able to facilitate the transition of individuals from one drug portfolio to another drug kind of category. So that was something I found.

Jennifer [00:24:13] I can't believe referees want you to take that out. They aren't always right. OK, so then the next thing you look at is whether the effects differed in places that happen to have lower unemployment rates at the time that someone got out or that happened to receive funding from the Second Chance Act, which is a federal government program aiming to facilitate reentry and reduce recidivism. So did the effects of legalization on criminal behavior vary with these local characteristics?

Heyu [00:24:39] Yeah, that's definitely something I've found as well. I found the increase in recidivism really kind of varied significantly with the local county characteristics, specifically in areas where, well, I guess time-varying county characteristics, I should say. I look at unemployment rates at the quarterly level for each county and I find that the rise in recidivism was much less. I guess- offenders were released into- at a time and location when the unemployment rate was low. So it seems like the availability of jobs in the legal sector play a significant role in the transition process. So you can think when these individuals are re-optimizing, whether there are opportunities or how easy job opportunity, career opportunities in the legal sector does play a significant role in whether these individuals transition to the trafficking or distribution of other drugs.

Jennifer [00:25:25] Yeah, and this is still I mean, there's obviously other work kind of showing that sort of effect on- you know, if you happen to be released in the strong labor market, you're better off. But this is sort of beyond because you're looking at the interaction effect here. And it's especially beneficial to these marijuana dealers that are coming out who have had their their labor market interrupted by the legalization. I think what the analysis highlighted for me was just that this is really a transition period and it's sort of this opportunity that we have to kind of redirect someone onto a different path when the local labor market provides opportunities for them.

Heyu [00:25:58] Yeah, I definitely think so. I think it really highlights this as like a critical re-optimizing- a critical juncture, I guess, in the career trajectory and progression of these individuals. And with local resources, I think the results suggest this provides an opportunity for them to be rehabilitated.

Jennifer [00:26:14] Yeah. And then finally, you use data from the NLSY, which is a survey, to do a supplemental analysis. So you consider the effects of marijuana legalization on criminal activity and employment for those who report selling marijuana in the past but who had never been arrested. And this would not show up in the

administrative data, which is the core of your paper. So why is this analysis useful? Tell us why you do this. And what do you find when you use the NLSY?

Heyu [00:26:41] A shortcoming of analysis with administrative data is that the administrative data speaks to the effect of legalization on a very specific subset of marijuana offenders. You know, those who have been previously arrested, caught, and incarcerated for the crime and that's just really not a random or perhaps representative sample of the target population of marijuana dealers overall. And given that there is a lot of existing research which shows that having a criminal record, I think, has strong disemployment effects and makes it hard to obtain hard to find employment, it could be reasonable to assume that the effect of legalization could be highly heterogeneous, dependent on marijuana dealers, depending on whether those individuals have a criminal record or not. So to kind of try understand that, I do incorporate a separate source of data, which is the National Longitudinal Survey of Youth. This is a very rich longitudinal dataset that follows a nationally representative cohort of adolescents from 1997 onward. And these were individuals who were teenagers in 1997. It's the only data, to my knowledge, that actually contains information on criminal activity and behavior separate from arrests and incarcerations for those crimes.

Heyu [00:27:47] So with this data, I essentially found that there was not a significant amount of heterogeneity, depending on whether individuals had convictions for marijuana dealing or not. So from this dataset, I'm able to identify marijuana dealers based on whether these survey respondents self report selling marijuana any particular year. And I also look I look at it as an outcome, whether these individuals self report selling hard drugs in any given year. And I find the self report of marijuana dealers became significantly more likely to self report selling hard drugs, which is very consistent with the results I find with administrative data. But I do not find a significant amount of heterogeneity based on the criminal records of these self reported dealers. So this suggests that the barrier, I guess, to the legal labor market, based on having official criminal record, does not fully explain the results.

Jennifer [00:28:40] Yeah, so it's not that people aren't moving into the legal marijuana sector just because they have a criminal record and can't get a job there, which would be an interesting finding if it were the case and would suggest sort of a different policy going forward. Like maybe we should relax that requirement. But it actually seems like their human capital has just become more valuable in the illegal sector for other drugs. And so they're shifting even if they don't have a criminal record that would prevent them from getting a formal sector job. Is that right?

Heyu [00:29:10] Yeah, that's my kind of interpretation of what I find. It seems like, yeah, like the barriers to the legal employment on the basis of having a criminal record does not by itself explain what's happening.

Jennifer [00:29:20] And then I think you also look at employment specifically. Did you find any effect there?

Heyu [00:29:26] Right. So with NLSY, I am also able to look at kind of a self reported earnings from kind of a legitimate job. And there I find there's essentially no effect on legal earnings, suggesting that while there is a significant substitution into other criminal activities, perhaps a substitution into legal jobs and legal careers, it was not significant. However, the one shortcoming of the analysis is that the sample size of self reported

marijuana dealers in the NLSY is rather small, so it could just be that I'm underpowered to detect the transition to the legal sector.

Jennifer [00:29:57] This is the perpetual problem with the NLSY. Super rich data, the only dataset that exists at the moment that includes information on criminal behavior and other stuff, but the sample is just tiny, especially when you get down to these specific categories. But still super useful and I think interesting to kind of dig into, for exactly the reasons that you were just describing. So what are the policy implications here? What should policymakers and practitioners and advocates who are listening to this take away from your results?

Heyu [00:30:27] It's a great question. I like to say that I did not interpret my paper as evidence against legalization. And I certainly would caution policymakers from jumping to that conclusion. I think one of the things my paper shows is that you can't just put the genie back in the bottle. The problems that are created by drug prohibition cannot just be easily solved by legalization. Once criminal careers and organizations exist, they're quite persistent and difficult to eradicate. So given that we live in a state of a world where marijuana has been prohibited and criminalized for such a long time, it would be naive to think that individuals who have built a career of distributing marijuana would simply—illegally—will simply kind of return to the legal sector once the drug has been legalized. So in the short run, perhaps legalization should be paired with some intervention targeted at these vulnerable groups in order to rehabilitate them, because I do believe it is a critical juncture and provides opportunity for rehabilitation. I also think that I guess one of the takeaways from my results is that drug policies should not be considered in isolation. Definitely on the supply side, as my results seem to indicate, that the supply side of different drug markets are definitely linked and when we consider kind of policies with respect to drugs, these linkages should certainly be taken into consideration as well.

Jennifer [00:31:44] Have any other papers come out since you first started working on this study that are related to this topic, broadly speaking?

Heyu [00:31:52] Yeah, I think there's been quite a number of interesting papers that have come out or that are kind of broadly related to the topic. There's been a couple of papers in the setting of developing countries that show that kind of exposure to narcotic trafficking organizations play a significant role in the later life outcomes of youth. And there's also another paper which showed that trade induced displacement seems to exacerbate drug related crimes, I believe in Mexico. And within the economics of crime, there's also been several interesting papers that that study kind of how substitutable crimes are. I guess on a conceptual level, my paper's definitely related to that topic in thinking about the substitutability between crimes. And there is definitely a paper that uses, I think, data from the UK on the price of different illicit goods to show that the theft and robbery across different types of products are substitutable. So I think those are some of the recent developments that are definitely related to my paper as well.

Jennifer [00:32:49] And what's the research frontier? What are the next big questions in this area that you and others will be thinking about going forward?

Heyu [00:32:54] That's a great question. I'm not sure if I'm qualified to talk about the research frontier, but I do have a couple of follow up questions, I think, to this paper that I was thinking about exploring. I guess one direction I was thinking about perhaps exploring is throughout this paper I'm thinking about substitutions and reoptimization decisions at the individual level. Perhaps it would be interesting to consider these at the organizational

level as well, given that drug trafficking organizations and drug cartels play a significant role in the drug business in the United States at the wholesale distribution level. And I think prior to the legalization of marijuana, a significant amount of marijuana was, I guess, imported to the United States or trafficked into the United States from abroad, so it'd be interesting to see whether those organizations further upstream are also responding to these legalization shocks at some level.

Heyu [00:33:42] And I also think it would be kind of- another direction I think would be kind of interesting would be to possibly expand the results. So thinking about individuals who have become marijuana dealers in the absence of legalization—so people who have yet to commit crime—to see whether those individuals are- I guess, in the absence of legalization, if you were going to become a marijuana dealer—so if you're potentially a young person—whether there is any kind of change in behavior for for those groups. So essentially kind of a cohort level analysis focusing on people who would perhaps have dealt marijuana, had the drug not been legalized to see whether there's any changes for those individuals.

Jennifer [00:34:17] Oh, that's interesting. Yeah, so maybe there's this transition period where some people who had their careers disrupted become more hardened offenders sort of and are dealing harder drugs. But maybe there's this later cohort that they avoid criminal behavior entirely, perhaps because this possibility is not available to them.

Heyu [00:34:35] Exactly. So it's kind of a job ladder in the criminal labor market where you start out dealing pot, dealing marijuana before escalating to harsher crimes. Perhaps by getting rid of this bottom rung on the ladder, you're- there is a really kind of positive development for would-be marijuana dealers as opposed to the former marijuana dealers.

Jennifer [00:34:52] Yeah, that would be interesting to see. My guest today has been Heyu Xiong from Case Western Reserve University. Heyu, thanks so much for talking with me.

Heyu [00:35:00] Thank you so much for having me.

Jennifer [00:35:01] You can find links to all the research we discussed today on our website, probablecausation.com. You can also subscribe to the show there or wherever you get your podcasts to make sure you don't miss a single episode. Big thanks to Emergent Ventures for supporting the show. And thanks also to our Patreon subscribers. This show is listener supported, so if you enjoy the podcast, then please consider contributing via Patreon. You can find a link on our website. Our sound engineer is John Keur with production assistance from Haley Grieshaber. Our music is by Werner and our logo was designed by Carrie Throckmorton. Thanks for listening and I'll talk to you in two weeks.