



2015 House Bill 3400 Recreational Marijuana Supply and Demand Legislative Report

Oregon Liquor Control Commission

February 1, 2017

Executive Summary

House Bill 3400 was signed into law in the 2015 Regular Session of the Oregon Legislature and tasked the Oregon Liquor Control Commission (OLCC), the agency responsible for regulating the recreational marijuana market in Oregon, with studying the question of supply and demand in the recreational marijuana market. This report analyzes the production of usable marijuana (flower and leaves) by licensed producers and sale of marijuana items by licensed retailers during 2016 to evaluate the size of supply and demand and the degree to which the two are in equilibrium in Oregon.

In total, approximately 655 metric tons (wet weight) of usable marijuana was produced by licensed producers in 2016. This does not include product produced in the (medical) market regulated by the Oregon Health Authority (OHA). As an agricultural product that is harvested wet and left to dry/cure for several weeks, the product sold to consumers is as low as 10-15% of the originally harvested weight. This makes it difficult to translate a wet harvested weight to market supply.

In total, 18% (115 metric tons) of the harvested weight has been packaged as of January 25, 2017. Approximately 14.6% (17 metric tons) of the product packaged by producers has been shipped to other licensees. The overwhelming majority of supply currently remains at the site of producers and wholesalers and has yet to work its way through the supply chain.

To this point approximately 4.5 metric tons of usable marijuana harvested within the recreational market has been transferred to a retailer. Retailers licensed on or before December 31, 2016 transferred approximately 3.75 metric tons of usable marijuana into the OLCC system, and more than 60% of that inventory has been sold as of January 25, 2017.

In total, sales of marijuana items at licensed OLCC retailers totaled approximately \$11,773,000 between October 1 and December 31, 2016. Seventy-one percent of the OLCC market value was usable marijuana. The cannabis industry has a range of value-added products that contain usable marijuana. The variation in how much usable marijuana actually goes into each product makes it difficult to match the demand for items such as extracts, concentrates, edibles, etc. with the supply of marijuana. This is particularly true in the short-term given that many processed items were created within the OHA system and transferred to the recreational market, giving the OLCC limited visibility into how much usable marijuana represents the unit final weight of an individual item.

It is too early to know whether supply and demand in the Oregon recreational marijuana market are in equilibrium. This is due to a number of factors in regards to both supply and demand:

- **Data entry errors.** The OLCC relies on Metrc (OLCC's Cannabis Tracking System) to monitor day-to-day activity. As the primary regulatory tool of the recreational market, Metrc records all data entry including errors and other mistakes. OLCC can account for errors and mistakes as a compliance issue. However, there is currently no simple process to differentiate errors in the summary market data the system produces.
- **Short time horizon of estimates.** Due to the high proportion of outdoor licensees currently in the OLCC system, the supply of the market is heavily concentrated in one month. This supply has yet to work its way through the entirety of the supply chain. At this point it is impossible to

determine the degree to which there may be supply in excess of demand because the demand has not yet had the opportunity to manifest itself.

- **Transitioning markets.** “Early start” sales and initial start-up inventory for producers, processors, and retailers makes supply estimates difficult because of the influx of product from one system to the other. When the two systems stabilize and products are produced within one or the other, a purely recreational supply estimate will be more possible.
- **Product mix.** The diversity of final products in the recreational system will always make estimations of a supply/demand equilibrium difficult. As the market share of processed goods (extracts/concentrates, edibles, topicals, etc.) increases or decreases, the amount of usable marijuana required on the supply side would also vary. As the market matures the supply and demand should stabilize, but given the flux of the market participants and lack of historical market data, this will take place over the medium- and long-term, not in the short-term.

At this time it is too early to know the degree to which there is excessive or insufficient supply to match demand. As the market continues to mature, data is reported, and the transition between the medical and recreational system stabilizes, accurate market analysis will become more possible.

Background

House Bill 3400 was signed into law in the 2015 Regular Session of the Oregon Legislature and tasked the Oregon Liquor Control Commission (OLCC), the agency responsible for regulating the recreational marijuana market in Oregon, with studying the question of supply and demand in the recreational marijuana market. Specifically, the law states that:

On or before February 1 of each odd-numbered year, the Oregon Liquor Control Commission shall report to the Legislative Assembly in the manner required by ORS 192.245, the approximate amount of marijuana produced by persons who hold a license under section 19, chapter 1, Oregon Laws 2015, and the approximate amount of marijuana items sold by persons who hold a license under section 22, chapter 1, Oregon Laws 2015, and whether the supply of marijuana in this state is commensurate with the demand for marijuana items in this state.

This report analyzes the production of usable marijuana (flower and leaves) by licensed producers and sale of marijuana items by licensed retailers during 2016 to evaluate the size of supply and demand and the degree to which the two are in equilibrium in Oregon.

Usable Marijuana Harvested

Early in the licensing process, the OLCC placed a priority on licensing outdoor producers in order to align with the outdoor growing season. This prioritization, combined with the favorable cannabis growing conditions in Oregon, resulted in a predominant share of outdoor producers during 2016 (see Figure 1). Consequently, the production of usable marijuana was heavily concentrated during the outdoor grow season (see Figure 2).

Figure 1: Cumulative Number of Producer Licenses by Type

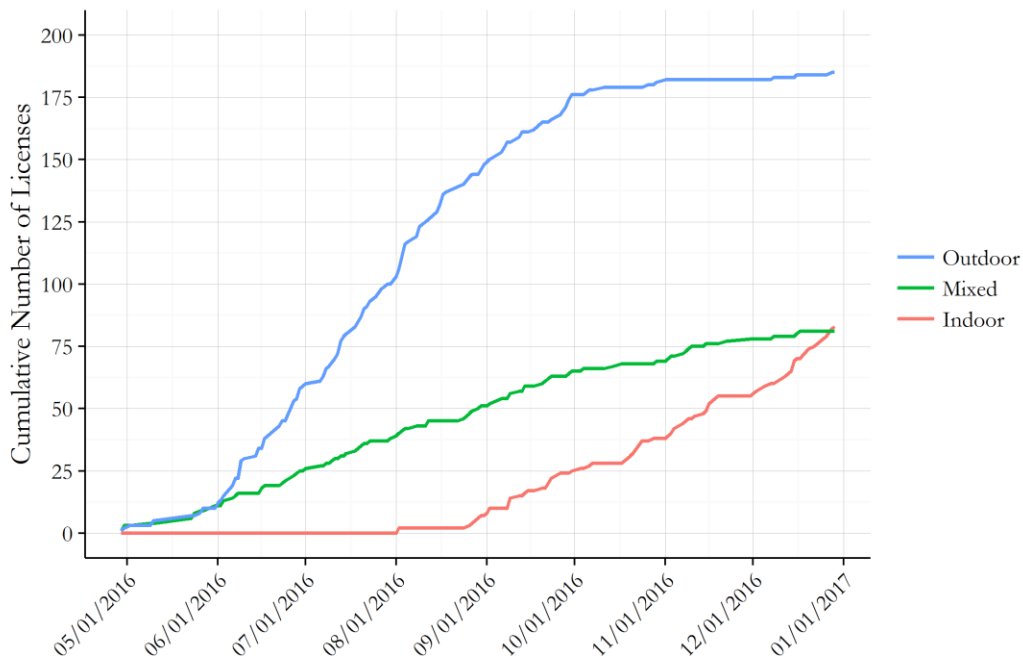
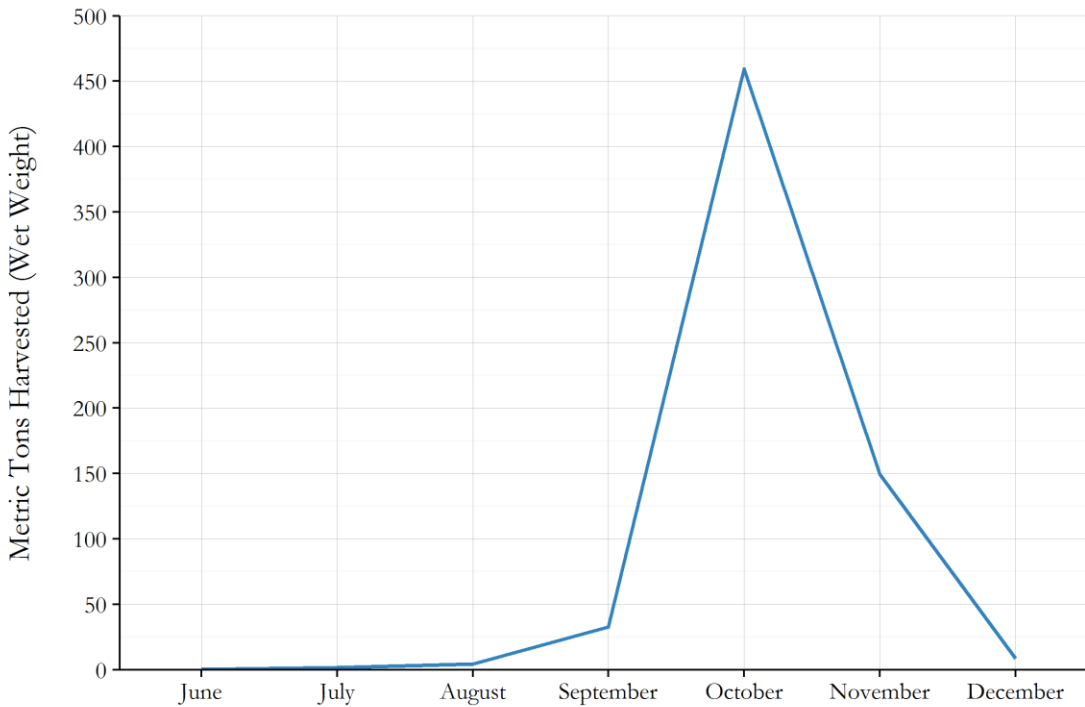


Figure 2: OLCC Regulated Wet Weight Harvest (in metric tons) by Month



In total, approximately 655 metric tons (wet weight) of usable marijuana was produced by licensed producers in 2016. This does not include product produced in the (medical) market regulated by the Oregon Health Authority (OHA). For example, under OAR 845-025-2100, OLCC producers previously registered with OHA are permitted to transfer a certain amount of usable marijuana into the recreational system. The numbers above reflect only the actual harvest of plants in the OLCC system and therefore is an underestimate of the total supply of usable marijuana in the recreational market. The implications this has on estimating supply/demand equilibrium is discussed below.

Usable Marijuana Transferred

As an agricultural product that is harvested wet and left to dry/cure for several weeks, the product sold to consumers is significantly lower in weight than what is initially harvested. In general, evaporation during the drying/curing process will decrease the final product's weight by as much as 85-90%. Complicating things even more, many producers will transfer a whole harvested plant to a processor for extraction prior to drying/curing. This makes it difficult to translate a wet harvested weight to market supply. Various facility-specific factors may increase or decrease the moisture loss during the drying/curing process. Moreover, the market product mix may increase or decrease the weight being shipped by producers. For example, if there is greater demand for processed products, producers are more likely to ship full wet plants rather than dried/cured and trimmed product, which would result in the estimated shipped supply seeming larger.

The best method of estimating the supply of marijuana resulting from the 2016 harvest is to analyze 1) the weight of usable marijuana packaged by producers and 2) the weight of usable marijuana sent to

other licensees within the recreational market. The amount of usable marijuana packaged is a proxy for the weight of the finished product – that which has been dried and/or is intended for processors. The amount of usable marijuana shipped is an estimate of the supply working through the market.

In total, 18%, or 115 metric tons, of the harvested weight has been packaged as of January 25, 2017 (see Table 1). Harvests from the month of November have an unexpectedly large proportion of the wet weight packaged, which may indicate a larger than expected proportion of the product being transferred wet to processors.

Table 1: Metric Tons of Usable Marijuana Packaged

Month of Harvest	Metric Tons Packaged	Percent of Wet Weight
July	0.22	16%
June	0.01	9%
August	0.88	20%
September	5.13	16%
October	52.42	11%
November	55.18	37%
December	1.23	14%
<i>Total</i>	<i>115.06</i>	<i>18%</i>

Looking only at the product that has worked its way through the supply chain, approximately 17 metric tons, or 14.6%, of the product packaged by producers has been shipped to other licensees (see Table 2).¹ Nearly half of the product has been shipped from producers to wholesalers, with another 30% being sent from producers to processors. The overwhelming majority of supply currently remains at the site of producers and wholesalers and has yet to work its way through the supply chain. Given such a concentrated harvest of product in October and November, it is likely that producers and wholesalers intend to smooth supply out throughout the course of the year in order to avoid flooding the market.

Table 2: Metric Tons of Usable Marijuana Shipped and Received by License Type

		To			Total
		Wholesaler	Processor	Retailer	
From	Producer	8.5	5.1	3.2	16.8
	Wholesaler		1.5	1.3	2.8
	Total	8.5	6.6	4.5	19.6

Demand for Usable Marijuana

Similar to producers, licensed retailers converting from the OHA medical system were permitted to transfer inventory into the OLCC system. This was done primarily to guarantee a supply within the OLCC system prior to the large outdoor harvest. To estimate demand for usable marijuana within the recreational market the amounts transferred within the system (discussed above) must be added to the amounts brought into the system as start-up inventory. In total, retailers licensed on or before

¹ This estimate subtracts the amount shipped from wholesalers to eliminate double-counting of supply.

December 31, 2016 transferred approximately 3.75 metric tons of usable marijuana from medical inventory into the OLCC system, and more than 60% of that inventory has been sold as of January 25, 2017 (see Table 3). For the first set of OLCC retailers (those licensed in October), the percentage of initial start-up inventory sold is significantly higher. To this point approximately 4.5 metric tons of usable marijuana harvested within the recreational market has been transferred to a retailer. As the start-up product continues to be sold down the share of recreationally-produced product will continue to increase and facilitate the flow of supply.

Table 3: Amount of Start-Up Usable Marijuana (in metric tons)

	Initial Start-Up Quantity	Remaining Quantity	Percent Remaining
All Retailers Licensed in 2016	3.7	1.4	38%
Licensed in October	0.8	0.1	12.5%

Demand for Marijuana Items

The cannabis industry has a range of value-added products that contain usable marijuana. The variation in how much usable marijuana actually goes into each product makes it difficult to match the demand with the supply of marijuana for items such as extracts, concentrates, edibles, etc. Extracts and concentrates have various levels of conversion efficiency and varied THC concentration that affect ratios of input to output. Edibles in particular may be composed primarily of non-marijuana ingredients. These factors make it extremely difficult to translate supply to demand in terms of quantity. This is particularly true in the short-term given that many processed items were created within the OHA system and transferred to the recreational market, giving the OLCC limited visibility into how much usable marijuana represents the unit final weight of an individual item.

At this time it is impossible to determine whether quantity supplied of usable marijuana is in equilibrium with quantity demanded of all marijuana items. This will become more feasible as more data is collected, but in the short-term the best proxy for demand of marijuana items is the price paid and the market mix of goods.

In total, sales of marijuana items at licensed OLCC retailers totaled approximately \$11,773,000 between October 1 and December 31, 2016. The first retailers were licensed on October 1, and both the number of licensed retailers and sales increased steadily through the year. The number of retail licensees rose from nine on October 1 to 165 on December 31 (see

Figure 3) while the dollar amount of sales rose from approximately \$450,000 to \$2,225,000 over the same period (see Figure 4). The product mix of demand in 2016 leaned heavily towards usable marijuana (71%; see

Figure 5).

Figure 3: Cumulative Number of Retail Licenses, October 1 to Dec 31

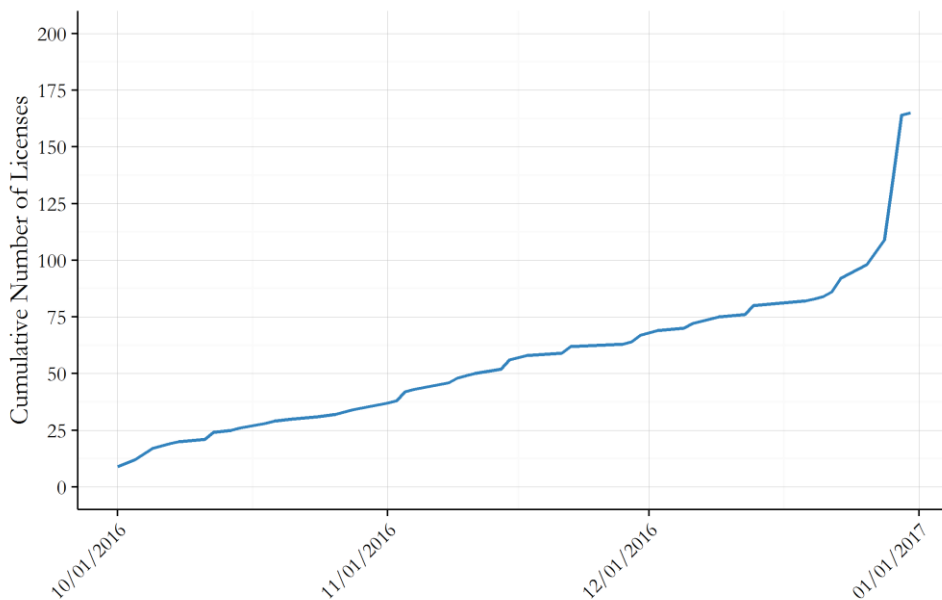


Figure 4: Dollar Amount of OLCC Regulated Sales by Product Type by Week

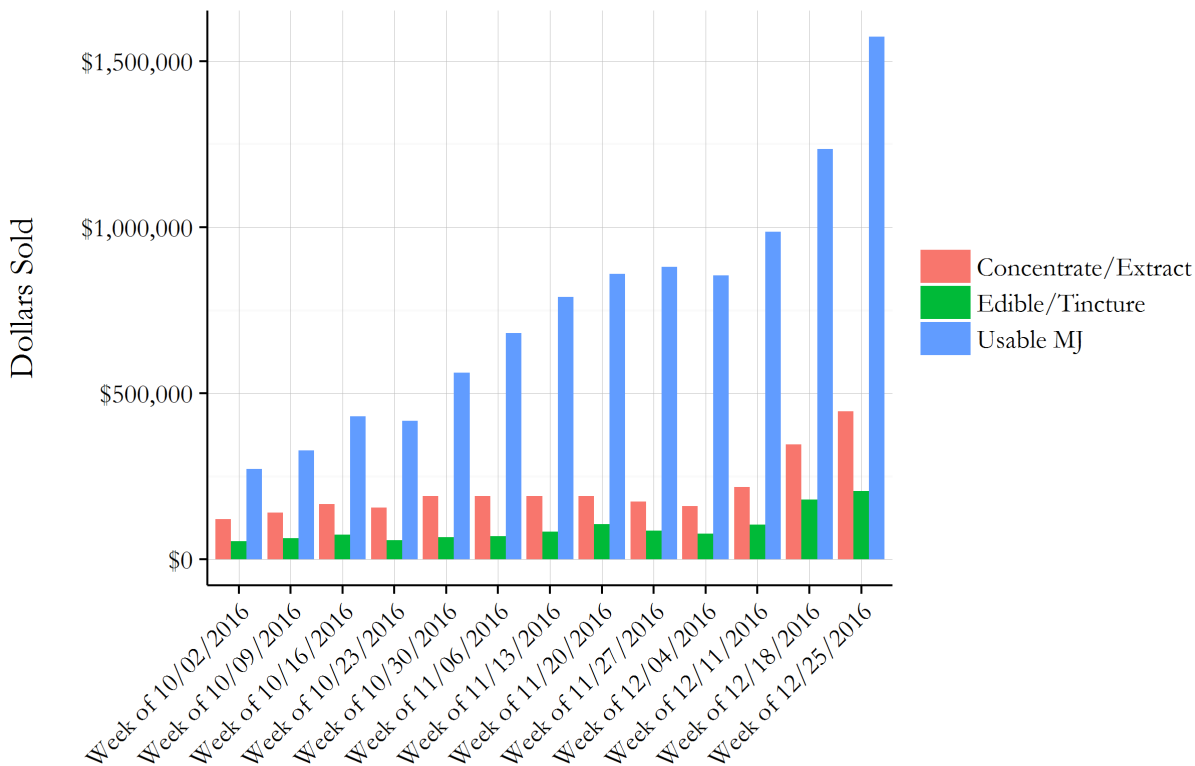
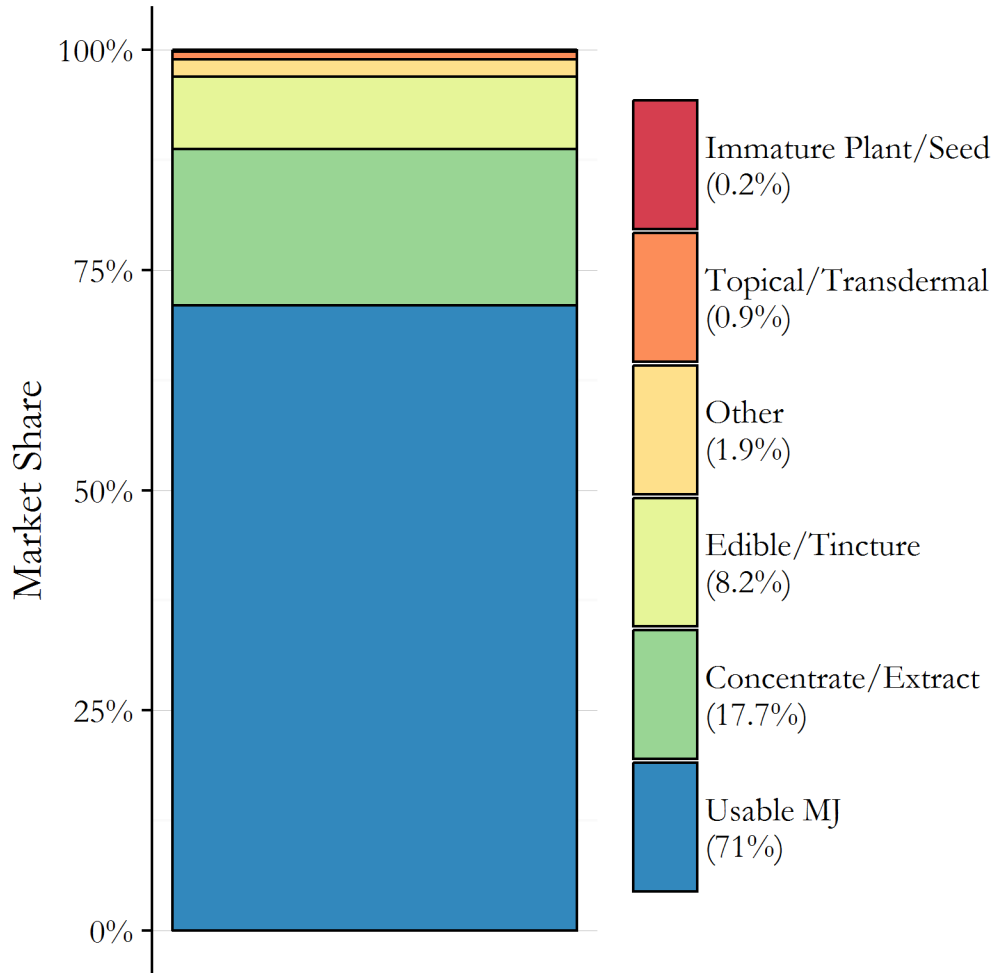


Figure 5: OLCC Regulated Market Share by Product Type



Limitations of Supply and Demand Estimates

It is too early to know whether supply and demand in the Oregon recreational marijuana market are in equilibrium. This is due to a number of factors in regards to both supply and demand.

Data entry errors

Metrc, the OLCC's Cannabis Tracking System, is first and foremost a regulatory tool – not a market data tool. As a regulatory tool the OLCC relies on Metrc to monitor day-to-day activity, including data entry errors and other mistakes. OLCC can account for errors and mistakes as a compliance issue. However, while there are a variety of ways to fix entry errors retroactively, the mistaken data remains in the system. For example, if a producer transfers a 1 pound package of usable marijuana to a retailer but the retailer accepts the product as 1 gram, the retailer can adjust the package retroactively to account for the mistake. But the incorrect transfer amount remains “on the books.” While the current inventory can be balanced via adjustments, the market data component will remain in error. This is by design so that the OLCC can see which mistakes are being made, but the tradeoff is that it can produce outliers and errors in the market data.

This issue is compounded in the short-term by the amount of mistakes being made by new licensees. To a certain extent this is to be expected with the steep learning curve involved in learning new regulations and becoming familiar with functionality of new software. However, entry errors throughout the supply chain and the ramp up of the new industry makes it very difficult to estimate the supply of product and its movement through the system.

Short time horizon of estimates

Due to the high proportion of outdoor licensees currently in the OLCC system, the supply of the market is heavily concentrated in one month. However, the demand is smoothed throughout the year. Given that the first recreational retailers were licensed in October, and that the majority of current retailers did not enter the recreational system until the end of 2016, supply has yet to work its way through the entirety of the supply chain. At this point it is impossible to determine the degree to which there may be supply in excess of demand because the demand has not yet had the opportunity to manifest itself.

Transitioning markets

The “early start” sales enabled dispensaries registered with OLCC to sell recreational product until December 31, 2016. This created a market for recreational product within the medical system and therefore beyond the scope of OLCC data collection. Moreover, as producers, processors, and retailers transitioned from OHA registration to OLCC licensure they were allowed to transfer start-up inventory from one system to the other. This makes supply estimates difficult because of the influx of product from one system to the other. When the two systems stabilize and products are produced within one or the other, a purely recreational supply estimate will be more possible.

Product mix

The diversity of final products in the recreational system will always make estimations of a supply/demand equilibrium difficult. As the market share of processed goods (extracts/concentrates, edibles, topicals, etc.) increases or decreases, the amount of usable marijuana required on the supply side would also vary. Usable marijuana is not fully converted into end products. Rather, a percentage of the net weight is extracted or concentrated into a new product. Conversely, marijuana may only reflect a small proportion of the net weight of an edible. As the product mix changes over time the supply of

usable marijuana may exceed or fall short of the quantity demanded by the full supply chain. As the market matures the supply and demand should stabilize and equilibrate, but given the flux of the market participants and lack of historical market data, this will take place over the medium- and long-term, not in the short-term.

Conclusion

Still in its first 12 months, the Oregon recreational marijuana market is on the road to maturity. As of October 2016 the full recreational supply chain is in place and product continues to work itself through the system from production to sale. At this time it is too early to know the degree to which there is excessive or insufficient supply to match demand. As the market continues to mature, data is reported, and the transition between the medical and recreational system stabilizes, accurate market analysis will become more possible.