ANALYSIS OF THE INFLATION PROCESSES WITHIN THE EUROPEAN DRUG MARKET

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Abstract:

In this research, we focus on the influence of prices, signified through inflationary processes, and their impact on the price levels of drugs. For this purpose, the situations within the European wholesale and retail drug market is studied, data related to the changes in the price levels of drugs is analyzed in a dynamic order, within the selected period 2011-2021, in order to highlight the trends of growth. The change in the purity/potency of drugs and the dependence of price levels on it is also studied. For this purpose, the price indexes of drugs are adjusted with the price/potency indexes. It was found that in general the price indices decreased, the purity/potency indices increased and accordingly the price index adjusted with purity/potency index decreased to a greater extent than the price indices.

Keywords: *Drug prices, Drug enforcement, Illegal drugs, Black market, Inflation,*

JEL:*E31, E26, E20, E29, E39, D40*

Introduction

Background

Currently the problem with producing, supplying, retailing and using illicit drugs in Europe and within the European Union in particular presents a serious challenge for European administrations and the society. (Europol, European Union serious and organised crime threat, 2021) Significant segments of scientific research are concentrated on the problems connected with law enforcement, social or medical aspects related to drugs. However, there is also an economic side of the issue. The illegal drug market, of course, has its specifics, but producers and suppliers within it have, first of all, economical motivation. Because of its high profitability, drug-related activities are core businesses for organized crime groups in Europe. (Europol, Shadow money – the international networks of illicit finance,, 2021)

Motivation

The research of the inflation within the European drug market might give a different perspective, enabling a deeper understanding of economic processes within it. In turn, this understanding can help both drug enforcement, the tracking of illegal cash flows and other activities related to the fight against crime, as well as clarifying the processes in the real economy and its interrelationships with illegal markets as well.

Most of the empirical studies of drug markets focus chiefly on the structure of these markets and the relationships among their participants, as well as on the number and types of drugs used and their market share (Boivin, 2014), (Thompson, A., Jeffords, C.,, 2019), etc. Some studies focus on the harms of drug use and the social cost (Hofmarcher, T., Leppänen, A., Månsdotter, A., Strandberg, J., Håkansson, A.,, 2024), (Casal, B., Iglesias, E., Rivera, B., Currais, L., Costa Storti, C.,, 2023). The main aim of the current study is the analysis of the inflation processes in the European drug market. Thus, this research is focused on the relationships between the current situation on the drug market for several of the most popular drugs, the respective quality and purity of these drugs, and the price index for each type of drug.

Methodology

In order to accomplish the study, there are used methods, such as the comparative trend analysis for drug price/quality and price adjusted index for the selected period of 2011-2021. Also used is a time dynamic linear analysis with detailed figures.

1. European drug market situation

1.1 Cannabis - the market situation.

According to the EMCDDA, 29.3% (or about 84 million people) of the EU population aged 15-64 have used cannabis, with 7.9% (about 22.6 million people) having used or using it in the last year. (European Monitoring Centre for Drugs and Drug Addiction, European Drug Report 2023: Trends and Developments, 2023) According to the same data, 1.3% of adults (15-64 years) or 3.7 million people use cannabis daily or almost daily (more than 20 days a month).

The price of cannabis (herbal) on the European retail market ranges from €6 to €25 per gram, with interquartile range (IQR) between €8 and €12 per gram. The content of the main psychoactive substance tetrahydrocannabinol (THC) varies from 2 to 14 per cent, with an IQR 7%-13 %. On the wholesale market, cannabis (herbal) is sold at prices ranging from 1796 €/kg to 5652 €/kg, with an IQR 2214-4926 €/kg.

According to the cannabis market data in the EMCDDA's European Drug Report 2023 the price of cannabis (resin) on the EU retail market ranges from 4 to 30 €/gram, the IQR is in range 6-10 €/gram. On the wholesale market, cannabis (resin) is traded at prices ranging from €1,950/kg to €5,010/kg, with IQR €3107-€3,970/kg.

The content of the main psychoactive substance tetrahydrocannabinol (THC) on the retail market varies between 2 and 32 percent; the interquartile range is between 12% and 29 %. (European Monitoring Centre for Drugs and Drug Addiction, Statistical Bulletin 2023, 2023)

1.2 Cocaine market situation

According to EMCDDA summary data, 5.4% of the EU adult population (15-64 years), or about 15.5 million people, have used cocaine, with 1.3%, or 3.7 million people, having used it in the last year. (Europol E. M., (2022))

On the retail market, the price of cocaine ranges from 22 to 98 €/g., with an IQR 56-90 €/g. On the wholesale market, cocaine is sold at prices ranging from €28,875/kg to €38,545/kg, with an IQR €33091-€3,737/kg.

The purity of cocaine in the retail market fluctuates between minimum and maximum values, 48% and 85% respectively. The interquartile range is 56%-85%.

1.3 Synthetic stimulants

Synthetic central nervous system stimulants available on the drug market in Europe include amphetamine, methamphetamine and, more recently, synthetic cathinones. Amphetamine use is the most common within the European market. 3,6% of adults (15-64 years), or about 10.3 million people used amphetamines lifetime and 0,7% or 2 million people having used or using in the last year. (European Monitoring Centre for Drugs and Drug Addiction, European Drug Report 2023: Trends and Developments, 2023)
On the EU retail market, the price of amphetamine ranges from 7 to 59 €/g., the IQR is from 9 to 19 €/g. On the wholesale market, the amphetamines are available at prices ranging from 1313 €/kg to 11540 €/kg and IQR is between 2290 and 4371 €/kg.

The purity of amphetamines on the European retail market ranges between minimum and maximum values, 9% and 69% respectively and IQR 21%-35%.

On the retail market price of methamphetamine is between 25 €/g and 100 €/g, IQR 36-83 €/g and purity 27%-100% with an IQR70%-91% (European Monitoring Centre for Drugs and Drug Addiction, Statistical Bulletin 2023, 2023)

1.4 3 4-methylenedioxy-n-methamphetamine (MDMA)

On the European retail market, the sell price of MDMA tablets ranges from 4 to 19 €/tablet, and IQR 7-10 €/tablet.

Accordingly, sales per gram range from 14 to 65 €/g powder, IQR of the price is 18-40 €/g powder. On the wholesale market, the supply of MDMA tablets ranges in price from 750 to 8352 €/1000 tablets, with an IQR 1763-5055 €/1000 tablets.

The purity of MDMA in the EU retail market ranges from 42 to 100 percent, with IQR from 69 to 85 percent. MDMA content variate between 38-190 mg/tablet, IQR is 161-173 mg/tablet. (European Monitoring Centre for Drugs and Drug Addiction, Statistical Bulletin 2023, 2023)

1.5 Heroin and other opioids

The EU retail heroin market is characterized by minimum and maximum price levels ranging from 19 to 93 €/g. respectively IQR is 24-45 €/g.

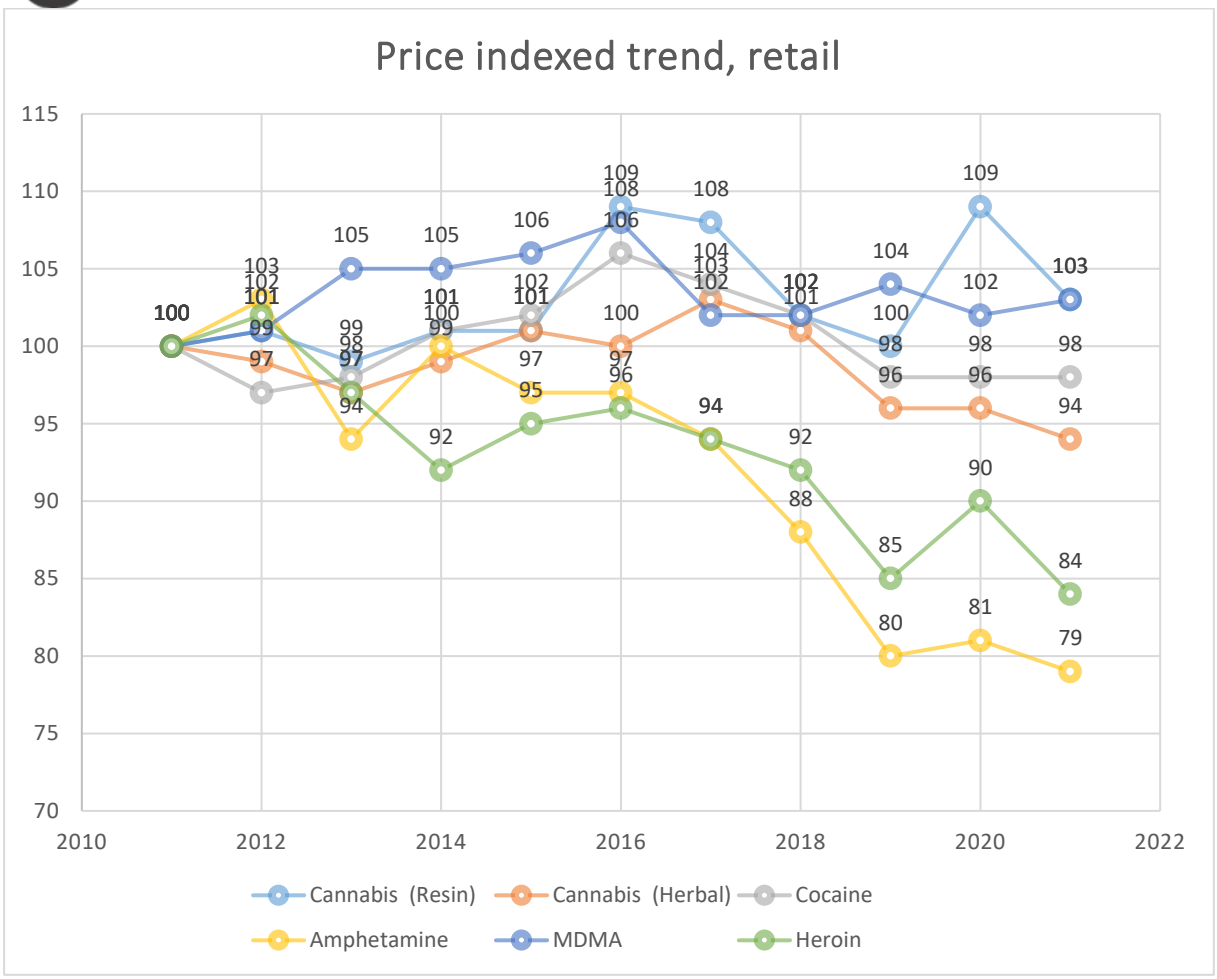
Wholesale prices are at their minimum level of 20162 €/kg and at their maximum level of 31180 €/kg respectively.

Heroin purity ranges from 13 to 47 percent at its lowest and highest points. IQR of the purity is between 16 and 24 percent. (European Monitoring Centre for Drugs and Drug Addiction, Statistical Bulletin 2023, 2023)

2. Analysis of inflationary processes in the European drug market

Considering that the data for the prices and price levels within the drug market is not complete and come from different sources, with different levels of authenticity, it is hard to compile or to find trustworthy statistics concerning the inflation rate within this market. (Caulkins, 2007) The most reliable is the data from the drug reports of EMCDDA (Werb D, Kerr T, Nosyk B, et al, 2013; 3)

Figure 1. Price indexed trend, retail



Source: (European Monitoring Centre for Drugs and Drug Addiction, Statistical Bulletin 2023, 2023)

Table 1. Price indexed trend, retail

Year	Cannabis		Cocaine	Amphetamine	MDMA	Heroin
	(Resin)	(Herbal)				
2011	100	100	100	100	100	100
2012	101	99	97	103	101	102
2013	99	97	98	94	105	97
2014	101	99	101	100	105	92
2015	101	101	102	97	106	95
2016	109	100	106	97	108	96
2017	108	103	104	94	102	94
2018	102	101	102	88	102	92
2019	100	96	98	80	104	85
2020	109	96	98	81	102	90
2021	103	94	98	79	103	84

Source: Monitoring Drugs and Addiction, Bulletin (European Centre for Drug Statistical 2023, 2023)

2.1 Inflation within the cannabis market

For the period of 2011-2021 with a base of 2011 = 100, the prices of cannabis (herbal) values show a slight deflationary process for the period 2012-2013 and 2018-2021, while in the interval 2015-2017 the increase in values is insignificant between 1 and 3 percentage points. The inflation rate for the whole period is (-6%) and due to the negative impact of the prevailing index levels below 100, we can determine that deflation is occurring.

During the period 2011-2021[1], the price indices for cannabis (resin) fluctuate from 100 to 103 percent. The highest levels are in 2016 and 2020 with values of 109 per cent, while in 2013 there is a drop to 99 per cent.

2.2. Cocaine market inflation

In the observed period of 2011-2021[2] with a base of 2011 = 100, we see the following tendencies for the cocaine: in 2012 and 2013, we have a decline in price levels of 97 and 98% respectively. In the interval 2014-2018, there is an inflationary process with the highest value of the price index being 106% in 2016 and in the interval 2019-2021 we find a sustained level of decline of 98%. The rate of inflation during the period is (-2%) which indicates a deflationary process.

2.3. Synthetic stimulants

The dynamics of price indices of synthetic stimulants (amphetamine) shows a stable deflationary process.[3] There is an increase compared to the previous period only in 2012 - 103%, maintaining the level of decrease in 2015 and 2016 at 97%, followed by a continuous decrease in price levels to 79% in 2021. The rate of inflation is (-21%).

2.4. MDMA

During the same observed period listed above, we can observe fluctuations in amphetamine price index values, but with a persistent trend towards an inflationary process. [4]We have the

[1] For the basic 2011 year the price of cannabis (herbal) ranges from 5-24 €/g, with an IQR of 8-12 €/g. For the same year the price of cannabis (resin) ranges from 3-18 €/g, with an IRQ of 7-13 €/g.
[2] For the basic 2011 year the price of cocaine ranges from 50-98 €/g, with an IQR of 56-77 €/g.
[3] For the basic 2011 year the price of amphetamine ranges from 8-28 €/g, with an IQR of 9-21 €/g. For the same year the price of methamphetamine ranges from 8-79 €/g, with an IQR of 16-70 €/g.

[4] For the basic 2011 year the price of MDMA ranges from 4-17 €/tablet, with an IQR of 5-9 €/g (European Monitoring Centre for Drugs and Drug Addiction, European Drug Report 2013: Trends and developments, 2013)

highest value in 2016 at 108% and the lowest in 2012 at 101%, as well as two holding levels in the 2013-2014 and 2017-2018 intervals. The inflation rate is a positive number – (3%).

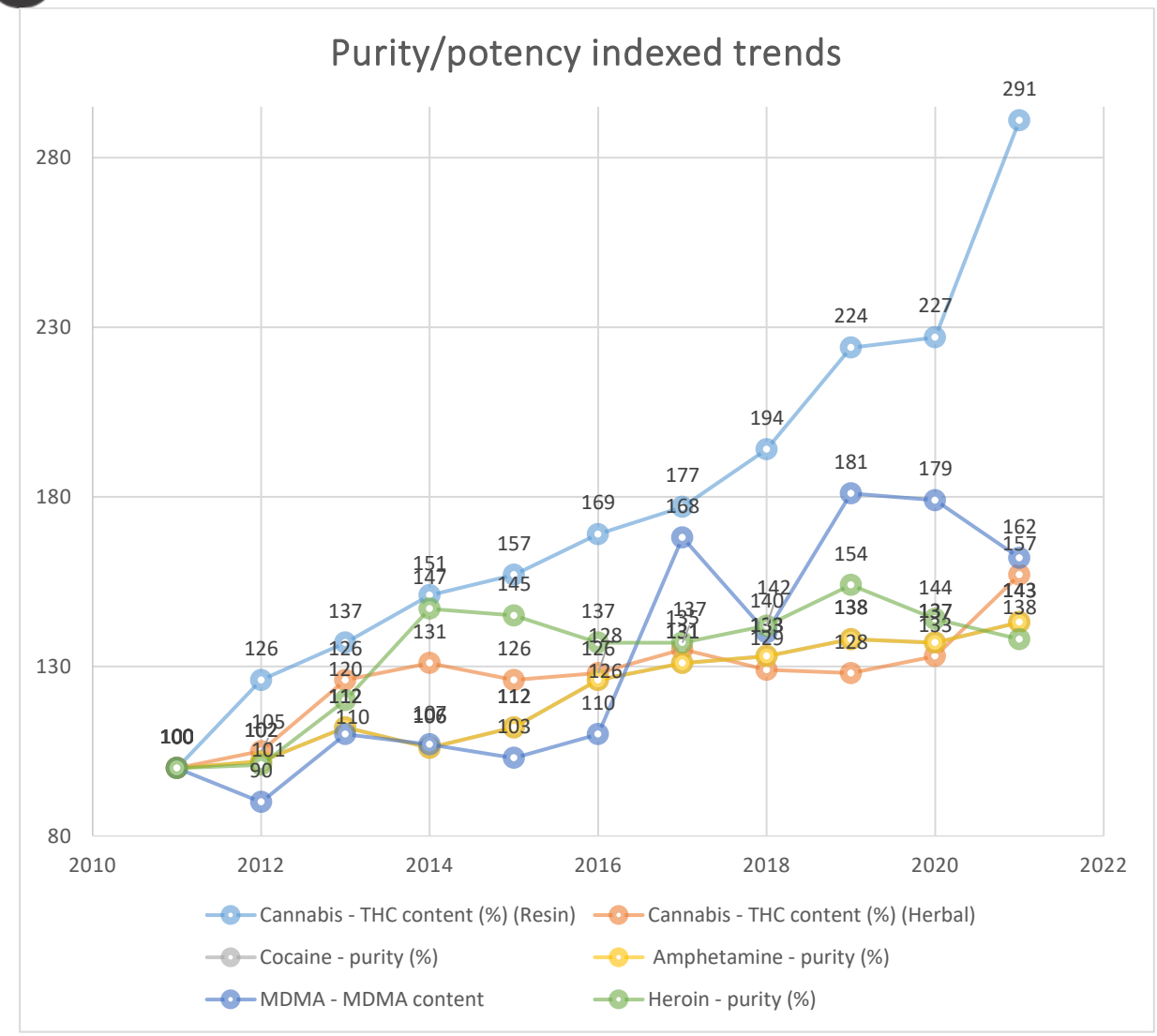
2.5. Heroin and other opioids

The trend in changes in heroin price levels has varied with values below 100% since 2012, with the highest being 97% in 2013, and the lowest being 84% in 2021. This shows a deflationary trend. The rate of inflation over the observed period is (-16%).[5]

3. Analysis of purity/potency of drugs within the European market

Figure 2. Purity/potency indexed trends

[5] For the basic 2011 year the price of heroin ranges from 24-143 €/g, with an IQR of 30-57 €/g. (European Monitoring Centre for Drugs and Drug Addiction, European Drug Report 2013: Trends and developments, 2013)



Source: (European Monitoring Centre for Drugs and Drug Addiction, Statistical Bulletin 2023, 2023)

Table 2. Purity/potency indexed trends

Year	Cannabis - THC content (%)		Cocaine - purity (%)	Amphetamine - purity (%)	MDMA - MDMA content	Heroin - purity (%)
	(Resin)	(Herbal)				
2011	100	100	100	100	100	100
2012	126	105	102	102	90	101
2013	137	126	112	112	110	120
2014	151	131	106	106	107	147
2015	157	126	112	112	103	145

2016	169	128	126	126	110	137
2017	177	135	131	131	168	137
2018	194	129	133	133	140	142
2019	224	128	138	138	181	154
2020	227	133	137	137	179	144
2021	291	157	143	143	162	138

Source: (European Monitoring Centre for Drugs and Drug Addiction, Statistical Bulletin 2023, 2023)

3.1. Cannabis

The potency of cannabis (resin or herbal) depends on the content of tetrahydrocannabinol (THC). For cannabis (resin or herbal), there is a pronounced upward trend in potency over the 2011-2021 study period,[6] with index values increasing for each subsequent year and peaking in 2021 at 291% for resin and 157% for herbal, respectively. The deviations from the base year are drastic for resin, 191 percentage points, and less so for herbal, 57 percentage points.

3.2. Cocaine

For the period 2011-2021[7] the indexed trend of the purity of cocaine within European retail market points out that the purity stays relatively stable with index values between 97 in 2012, up to 106 in 2016, and once again, a drop down to 98 in 2019. The data also shows a hold of this rate until 2021.

3.3. Synthetic stimulants

Here the criterion with stimulants is once again the purity. The dynamics of purity indices similarly have increasing values, except for 2012, but with fluctuations in the change of the indices in the dynamic order of years. The data from this trend shows the highest value in 2018 reaching 146% and the deviation showing a result of 41% percentage points.[8]

[6] For the basic 2011 year the potency (content) of THC in cannabis (herbal) ranges from 1-16 %, with an IQR of 5-10 %. For the same year the potency (content) of THC in cannabis (resin) ranges from 4-16 %, with an IQR of 5-11 %. (European Monitoring Centre for Drugs and Drug Addiction, European Drug Report 2013: Trends and developments, 2013)

[7] For the basic 2011 year the purity of cocaine ranges from 22-61 %, with an IQR of 29-48 %. (European Monitoring Centre for Drugs and Drug Addiction, European Drug Report 2013: Trends and developments, 2013)

[8] For the basic 2011 year the purity of amphetamine ranges from 5-30 %, with an IQR of 10-22 %. For the same year the purity of methamphetamine ranges from 16-82 %, with an IQR of 27-64 %. (European Monitoring Centre for Drugs and Drug Addiction, European Drug Report 2013: Trends and developments, 2013)

3.4. MDMA

The efficiency of the drug depends on the average 3,4-Methylenedioxymethamphetamine (MDMA) content in the tablets and the purity of the powder. Compared to the base (2011), [9] the index in 2012 fell down to 90%, after which the increasing values compared to the base in 2011 fluctuated over the years, peaking in 2019 at 181%. The deviation accounted for showed to be 62% percentage points.

3.5. Heroin and other opioids

The main criterion of the impact force of heroin is its purity. The general direction is increasing compared to the base year (2011). The highest value is reported in 2019 - 154%. The deviation is 38 percentage points.

The overall level of inflation is calculated using the average sum of the changes in the inflation levels for these six different drugs with the most common drug types for the period between 2011-2021, and then dividing the result by the number of these types of drugs – 6.[10]

[3% + (-6%) + (-2%) + (-21%) + 3%) + (-16%)] : 6 = (- 39%) : 6 = (- 6,5%)

4. Price index adjusted with Purity/Potency index

When reviewing the price-indexed trend, the data shows that it is not sufficient enough to fully reveal the real inflationary process because, apart from the lower price level at the end of the observed period compared to the beginning for four of the six drugs, an increase in "quality" was observed for all drugs. In these circumstances, there occurs a situation in which a drug with a higher potency or purity can be bought on the market at the same price or at a price lower than the previous one. Accordingly, at the same price level and from the same dose, the obtained narcotic effect is stronger. Due to this reason, when considering prices indexed trends and purity/potency indexed trends, it is necessary to make a correction of the price indices, which reflects the dependence between the price indices and the purity/potency indices. This will give a more realistic and comprehensive picture of the situation within the European drug market.

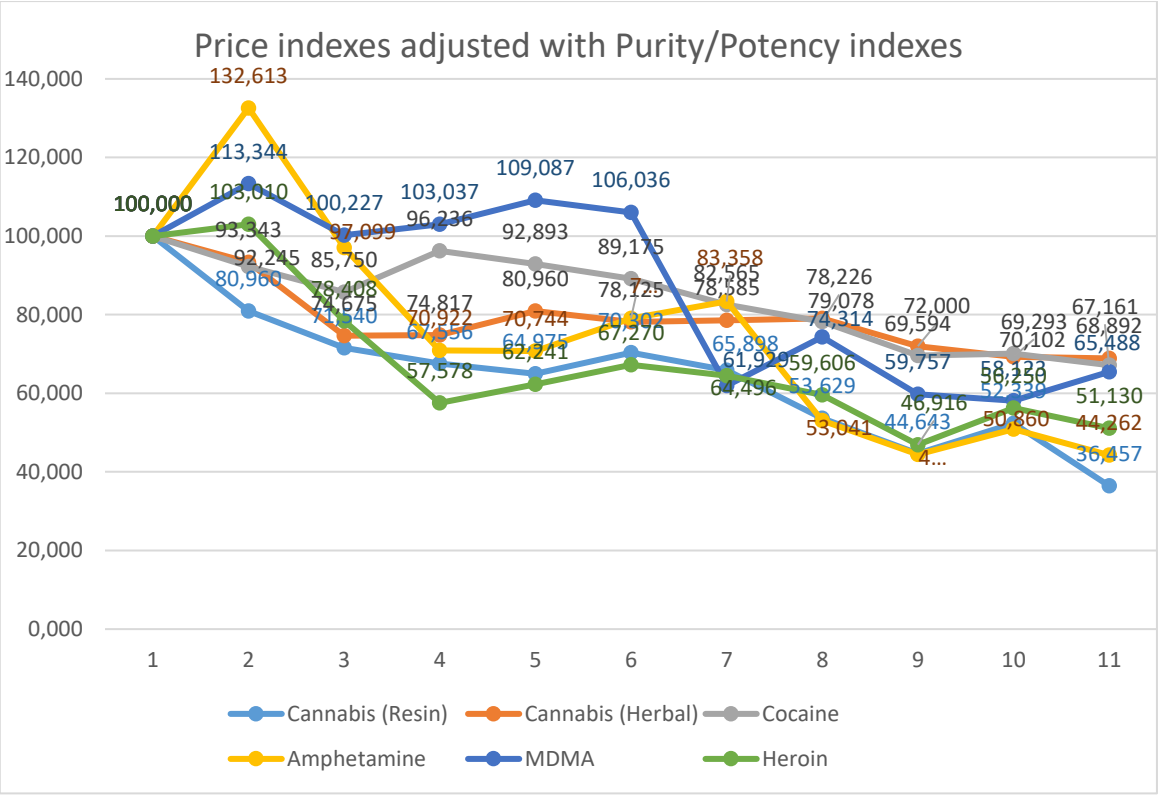
[9] *For the basic 2011 year the content in [mg/tablet] of MDMA ranges from 43-113, with an IQR of 64-90.* (European Monitoring Centre for Drugs and Drug Addiction, European Drug Report 2013: Trends and developments, 2013)

[10] The method for calculating of the inflation basket in this case is not applicable.

Thus, for the aforementioned reasons described above, a compiled price index adjusted with purity/potency index (PiAPi) for all drugs considered up to now was produced.

As a result, we adjusted the price indexes with the influence of purity/potency indexes. For this purpose, we calculated a coefficient as a ratio of the price index, adjusted with purity/potency index for each type of drug separately. Furthermore, the corresponding price indices of the specific drug were multiplied with the obtained value for the entire period. We analyzed the result of the adjusted price indices.

Figure 3. Price indexes adjusted with Purity/Potency indexes



Source: (European Monitoring Centre for Drugs and Drug Addiction, Statistical Bulletin 2023, 2023)

Table 3. Price indexes adjusted with Purity/Potency indexes

Year	Cannabis (Resin)		Cannabis (Herbal)		Cocaine		Amphetamine		MDMA		Heroin	
	PiAPi	Coefficient Pi/Pi	PiAPi	Coefficient Pi/Pi	PiAPi	Coefficient Pi/Pi	PiAPi	Coefficient Pi/Pi	PiAPi	Coefficient Pi/Pi	PiAPi	Coefficient Pi/Pi
2011	100,000	1,0000	100,000	1,000	100,000	1,000	100,000	1,000	100,000	1,000	100,000	1,000
2012	80,960	0,8016	93,343	0,943	92,245	0,951	132,613	1,288	113,344	1,122	103,010	1,010
2013	71,540	0,7226	74,675	0,770	85,750	0,875	97,099	1,033	100,227	0,955	78,408	0,808
2014	67,556	0,6689	74,817	0,756	96,236	0,953	70,922	0,709	103,037	0,981	57,578	0,626
2015	64,975	0,6433	80,960	0,802	92,893	0,911	70,744	0,729	109,087	1,029	62,241	0,655
2016	70,302	0,6450	78,125	0,781	89,175	0,841	79,067	0,815	106,036	0,982	67,270	0,701
2017	65,898	0,6102	78,585	0,763	82,565	0,794	83,358	0,887	61,929	0,607	64,496	0,686
2018	53,629	0,5258	79,078	0,783	78,226	0,767	53,041	0,603	74,314	0,729	59,606	0,648
2019	44,643	0,4464	72,000	0,750	69,594	0,710	44,444	0,556	59,757	0,575	46,916	0,552
2020	52,339	0,4802	69,293	0,722	70,102	0,715	50,860	0,628	58,123	0,570	56,250	0,625
2021	36,457	0,3540	68,892	0,662	67,161	0,685	44,262	0,560	65,488	0,636	51,130	0,609

Source: (European Monitoring Centre for Drugs and Drug Addiction, Statistical Bulletin 2023, 2023)

As we can see in Figure 3, all the curves of Price indexes adjusted with Purity/Potency indexes are going down, i.e. PiAPi is decreasing. In addition, it is noticeable that the decrease in PiAPi for all drugs is greater than the decrease in price indices, including those for drugs with an overt deflationary tendency. This means that the Purity-adjusted price (PAP) for the considered period has decreased significantly more for all considered drugs compared to the retail market price.

5. Results

As it can be seen from the market data, the most common drug in terms of the number of people using it is cannabis and the most expensive is cocaine. As shown, according to the analyzed data for the change in the price levels of separate drugs for the selected period, it can be concluded that with MDMA and cannabis (resin) we can see mainly an inflationary process, i.e. price indices increased compared to the base, while for the rest of the drugs, regardless of the fluctuations, the levels are mainly decreasing with the largest decrease in heroin and synthetic stimulants. This has an impact on the emerging trend to show more of a deflationary process.

The average level of inflation of the drugs included in the scope of the study for the period 2011-2021 is (- 6.5%), which indicates a permanent deflationary process under the influence of obvious deflations in 4 out of 6 types of drugs - cannabis (herbal), cocaine, synthetic stimulants and heroin.

According to the criterion Purity/Potency, we can find a clear upward trend for the entire study period for all drugs, with the greatest increase in potency (THC content) for cannabis (resin). For the period 2011-2021, its THC content has increased almost 3 times. For other drugs, over the ten-year period, the increase is from 138% for heroin to 162% for MDMA.

For the period 2010-2011, PiAPi decreased for all drugs. With the lowest value at the end of the period is cannabis (resin) – 36.46, which is logical considering the significant increase in potency (291%) and the insignificant increase in price (103%) of this drug. The smallest downgrade is the downgrade of PiAPi for the cannabis (herbal) - 68.9%.

As can be seen from the information above, PAP in 2021 are significantly lower than PAP in 2011. Because the dependence between PAP and drug harm, incl. deaths, is inverse, i.e. as PAP decreases, harms and deaths increase, (Hughes, C; S, Hulme; Ritter, A, 2020) the downgrading of PiAPi is highly likely to affect the increase in drug harm. Generally, within the European drug market, we have a tendency to decrease or approximately maintain the level of prices and increase "quality", i.e. purity/potency.

Conclusion

Generally, within the European drug market, we have a tendency to decrease or approximately maintain the level of prices and increase "quality", i.e. purity/potency. Due to the specifics of this market and the fact that the increased "quality" of the offered product actually means an increase of the harm during its usage, the mentioned trend is negative. (T.M, Brunt; M, van Laar; R.J.M, Niesink; W, van den Brink, 2010)

The observed deflation processes, especially taking into account the Price index adjusted with the Purity/Potency index, create prerequisites for increasing the drug availability on the European market. (D.A, Bright; A, Ritter, 2010) The increased availability itself, in turn, may lead to increased competition in supply, which may further drive down prices and increase the purity/potency of the drugs within the market.

Furthermore, we cannot separate the inflation from other processes within the market, so there remain many issues to be deeply researched. Some of the issues pertain to issues such as its relation and impact on the supply and demand, the limits within which it can move relatively independently of inflation in the real economy, its dependence of law enforcement, etc.

References

Boivin, R. (2014). Risks, prices, and positions: A social network analysis of illegal drug trafficking in the world-economy. *International Journal of Drug Policy, 25*(2), 235-243.

Casal, B., Iglesias, E., Rivera, B., Currais, L., Costa Storti, C.,. (2023). Identifying the impact of the business cycle on drug-related harms in European countries. *International Journal of Drug Policy*. doi:https://doi.org/10.1016/j.drugpo.2023.104240.

Caulkins, J. P. (2007). Price and purity analysis for illicit drug: Data and conceptual issues. *Drug and Alcohol Dependence*, 61–68.

D.A, Bright; A, Ritter. (2010). Retail price as an outcome measure for the effectiveness of drug law enforcement. *International Journal of Drug Policy 21(5)*, 359–63.

European Monitoring Centre for Drugs and Drug Addiction. (2013). *European Drug Report 2013: Trends and developments.* Luxembourg: Publications Office of the European Union.

European Monitoring Centre for Drugs and Drug Addiction. (2022). *EU Drug Market: Methamphetamine — In-depth.* https://www.emcdda.europa.eu/publications/eu-drugmarkets/.

European Monitoring Centre for Drugs and Drug Addiction. (2023). *European Drug Report 2023: Trends and Developments.* https://www.emcdda.europa.eu/publications/european-drug-report/2023_en.

European Monitoring Centre for Drugs and Drug Addiction. (2023, 16 06). *Statistical Bulletin 2023.* Retrieved from https://www.emcdda.europa.eu/data/stats2023_en

Europol. (2021). *European Union serious and organised crime threat.* Luxembourg: Publications Office of the European Union.

Europol. (2021). *Shadow money – the international networks of illicit finance,.* Luxembourg: Publications Office of the European Union.

Europol, E. M. ((2022)). *EU Drug Market: Cocaine — In-depth analysis.* https://www.emcdda.europa.eu/publications/european-drug-report/2023_en.

Hofmarcher, T., Leppänen, A., Månsdotter, A., Strandberg, J., Håkansson, A.,. (2024). Societal costs of illegal drug use in Sweden. *International Journal of Drug Polic, 123*. doi:https://doi.org/10.1016/j.drugpo.2023.104259.

Hughes, C; S, Hulme; Ritter, A. (2020, July No. 598). The relationship between drug price and purity and population level harm. *Trends & issues in crime and criminal justice*.

T.M, Brunt; M, van Laar; R.J.M, Niesink; W, van den Brink. (2010). The relationship of quality and price of the psychostimulants cocaine and amphetamine with health care outcomes. *Drug and Alcohol Dependence*(111), 21–29.

Werb D, Kerr T, Nosyk B, et al. (2013; 3, July 19). The temporal relationship between drug supply indicators: an audit of international government surveillance systems. *BMJ Open*.