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AKERLOF'S LEMONS AND PEACHES IN AZERBAIJAN CREDIT MARKET: TURNING LEMONS INTO LEMONADE THROUGH MONETARY TRANSMISSION CHANNELS

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ABSTRACT

The review of previous literature on Akerlof's lemons and peaches in the loan market provides extremely limited information. Our empirical study addressed the question of how monetary policy, through different transmission mechanism channels, influences the lemons and peaches in the credit market for Azerbaijan during 2006-2017. Based on the results of the VEC model, we found out that monetary policy through exchange rate, lending, and unexpected price level transmission mechanism channels negatively affects the lemons while they positively influence the peaches in the credit market of Azerbaijan. Empirical outcomes suggest the effectiveness of lending, unexpected price level, and exchange rate channel in terms of coping with lemons. It would be extremely engrossing to see which transmission mechanism channels are substitutes and which are complements to one another, based on which one can define whether the substitute or complement transmission channels are effective in terms of dealing with the lemons problem in the credit market.

Keywords: Azerbaijan, Monetary Policy Transmission Channels, Lemon Problem, Central Bank, Credit Market.

INTRODUCTION

The lemons problem in the credit market is an extremely popular issue and carries the importance of potential research analysis yet has not been scrutinized abundantly, which leaves so many gaps for future considerations. The general idea of the Akerlof's lemons problem is that the sellers of the used and bad quality cars have an information advantage over the buyers of those lemons, which triggers asymmetric information problem, and thus, makes the owners of peaches leave the car market as buyers offer a price that is the average of the value of lemons and peaches. In the content of the credit market, the borrowers, in comparison to the lenders, have more information regarding whether they will be able to pay their indebtedness on loans. This is what prevents the efficient and optimal allocation of financial resources, namely credits, to the most potential and productive users. In view of this, the market collapse occurs and leaves behind lemons only.

According to the report Problems and Opportunities for Leveraging SME Finance Through Value Chains in Azerbaijan by Asian Development Bank Institute Working Papers (July 2019), the problems of the credit market in Azerbaijan can be characterized by higher interest rates coupled with complicated documentations, which is the main potential reason lurking behind financial inclusion in Azerbaijan. Another factor restricting credit allocation is assumed to be the tremendous level of collateral levied on bank loans as it prevents SME financing in the country. Doing Business Report conducted by WB and the International Finance Corporation (IFC) ranked (2018) Azerbaijan as 122nd out of 190 countries in the world in terms of the easiness of the procedure to terminate credit procedures, which has been associated with the shortage of private bureaus.

In this study, we assume that the main drawback in the credit market is the lemons problem that stems from the fact that there is a lack of belief among banks as well as between lenders and borrowers in banking and credit systems, respectively. To be on the safe side and not engrossed in riskier activities, commercial banks prefer to deposit their money in the Central Bank rather than lending it out. This can also be translated into the asymmetric information problem that emerges the fear of lemons problem in banks as they do not have full information to define whether the household applying for the loan is lemon or peach. Banks highly doubt that borrowers of those loans will be able to pay their interest rates on time as the interest rate attached to the loan is extremely high. Given the role played by the Central Bank, we wondered how the aforementioned institution does can mitigate the lemons problem through monetary policy transmission mechanism channels in Azerbaijan. This, in turn, generates the following research questions:

1. *How significant are the monetary policy transmission mechanism channels in terms of influencing lemons and peaches in the long run?*
2. *Which channels have a positive effect on peaches, and which ones deteriorate the god quality credits in the credit market of Azerbaijan?*
3. *How do the effects of different mechanism channels alter from short to medium and long-run?*
4. *And finally, which transmission mechanism channels are recommended for the policy analysis of the Central Bank of Azerbaijan Republic (CBAR)?*

The main contribution of the study is that the lemons problem has never been addressed for the credit markets of Azerbaijan, and it has been limitedly scrutinized in the review of

previous literature. By applying VEC and VAR models, we will define the long run as well as short and medium-term cointegration between lemons, so as peaches and transmission mechanism channels of monetary policy. Based on the estimation results, we defined which channels should be utilized by the Central Bank of Azerbaijan Republic to mitigate the lemons problem in the credit market.

1. LITERATURE REVIEW

In this section of the paper, we will scrutinize the banking literature in which VAR and VEC models have been applied to measure the effects of different monetary transmission mechanism channels on lemons and peaches in the credit market. In doing so, we will be able to determine the existing gaps and niches in the review of previous literature, along with defining what the potential contribution of this study is. Even though there is an abundance of literature which addressed different research questions regarding the lemons problem in the car, housing, and labor market, there is an extremely limited number of studies devoted to analyzing how monetary policy transmission mechanism channels affect the good and bad quality loans in the credit market through empirical analysis.

We start with the analysis of the literature that investigated the lemons problem that emerged from the asymmetric information in the housing market. A study conducted by Chau and Choy (2011) claims that the lemons are overpriced in the case of the housing market. By differentiating between durable and non-durable loans, the authors defined that the former one is overpriced from 6.7% to 9.9% under the so-called "let the seller beware" and "let the buyer beware" rules, respectively which are different legal regimes. Based on the natural experiment in the housing market of Hong Kong, the authors managed to calculate the overpricing behaviour and premium of lemons in the housing market under different laws. The housing development referred to in this study was in the high-density region of Hong Kong, in which there were 12 blocks pertaining to the 40-story apartment buildings. The main empirical results derived from the Hedonic price model developed by Rosen (1974) suggested that the explicit housing prices in Hong Kong are predominantly affected by the area of the floor, the level of the floor, and the view of the floor. Another intriguing outcome of the study was that once we switch the rules of liabilities in a way that the buyers are enabled to beware, the overpricing of lemons in the housing market of Hong Kong will amount to a 32.3% increase. It was suggested that one potential reason lurking behind the question of why lemons spread is not eliminated by the housing developers is the potential lawsuit associated with the so-called "nondisclosure of information" that has to be considered.

In another study by Wandschneider (2014), where Landschaft is defined as a "cooperative mortgage credit association that emerged in the late 18th century" in Prussia, this study provides a bunch of empirical evidence on the lending mechanism through which the credits or loans were provided to the landowner. It was stated that to obtain a loan, the landowner and the Landschaft member had to issue a request. Later, the value of the estate was estimated, and the credit limit based on the profit of the landowner as well as the last sales price of the property was determined. After this credit was issued, the landowner could show up with the bond and ask for the payment in the upcoming six months. The lemons problem in the content of Landschaft credit was that only poor credit risk borrowers were attracted to the market, which triggered adverse selection issues accompanied by moral hazard. In view of this, the lenders will be disincentivized to provide the credits and capitals

to the group of lemons. To cope with this issue, entire noble estates were contained within the old Landschaft, which bestowed impartial access to credits at the fixed interest rate for all estates. This, in turn, generated an incentive for the provision of credits and capitals that ended up with a boost in the furnishing of credits.

To provide and dispose of water in the USA, septic systems along with wells are widely used. The lemon problems arose as the homeowners, in comparison to the home buyers and regulators, have an advantage of information asymmetry in the sense that they are aware of the belie pollution together with contamination risks triggered by the septic systems. The paper by Athnos (2019) defines septic systems and wells as "underground lemons", utilizing pooled difference-in-differences identification strategies to investigate the influence of the time of sales regulation in terms of dealing with the lemons problem in the housing market. The time of the sales regulations necessitated the imposition of certain quality standards that have to be satisfied by the septic systems and wells prior to the realization of any sales or transactions, which mitigated the information asymmetry problem. The empirical results obtained by the study detected no evidence in favor of an across-the-board increase in the house price in response to the time of sale adoption, whereas it revealed that the value of the property with septic and well systems expanded by 3% because of policy.

The lemons problem is observed not only in the housing market but also in the labor market as well, and one of the most appropriate studies that investigated the aforementioned issue is conducted by Barigozzi, Burani and Raggi (2014). The paper discusses that given the extremely strong and positive association between motivation and productivity, it is highly likely that workers with lower skills and less motivation will be attracted by a substantial increase in the number of salaries. However, under the condition of a positive yet relatively small association between motivation and productivity, the same amount of an increase in salary will motivate high skilled and more productive workers. The paper investigated the selection of workers to the different sectors in which the motivation and skills of workers are something intrinsic to them, and this is what creates an information asymmetry problem. The results of the theoretical analysis reveal that alterations in the composition of the pool of applicants in response to the adjustments in the offered wage rates greatly reckon on the distribution of motivation and ability belong to the population of the potential workers. The paper concluded that once the workers are heterogeneous with respect to motivation and productivity, higher salaries no longer attract more productive workers only. It also suggested that, under the independent distributions of those two characters, if there is a negative association between the motivation of a worker and the ability, the increase in wage will attract more productive yet less motivated workers. However, the best scenario according to the findings of the theoretical study is defined to be the positive but not too strong correlation between the ability and motivation of the workers, which entices more productive and more motivated workers.

In another study devoted to the lemons in the labor market, Kingsley, Gray and Suri (2014) discussed crowdsourcing which is a platform through which crowd workers (employees) and requesters (employers) are engaged in the task-oriented labor distribution. The main intention of the crowdsources is to match the firms and people who aspire to distribute the lion share of painstaking micro-tasks to the labor that is denoted by crowds to decline the labor and production costs as well as increase the economies of scale. Based on the longitudinal survey of Amazon Mechanical Turk (AMT). The main finding of the study suggested that the

monopsony labor market framework provides a more comprehensive labor market phenomenon that perfect competition cannot perform.

Lemon's problem is also scrutinized in the trade sector and was analyzed by the joint studies of Moreno and Wooders (2010). The theory on which the analysis is based manifests that in the market where the information asymmetry and moral hazard prevails, only low-quality goods will be traded in the perfectly competitive equilibrium. The scenario changes under the decentralized trade in a sense that not only low but also high-quality goods are traded at several prices even though the delay is inevitable. An advantage of the decentralized trade is that in the case of incremental frictions, the obtained surplus will be tremendous than that of surplus in competitive equilibrium, in addition to the fact that the payoffs will remain competitive as the frictions evaporate which is how the lemons problem is mitigated.

In a study by Asiama and Amoah (2019), the authors aimed at testing the hypothesis, which stated that the monetary policy influences the non-performing loans in Ghana. Their findings suggested that there is no statistically significant effect of monetary policy on the percentage growth of non-performing loans in the short run. However, as the economy moves in the long run, the effect becomes significant. the policy suggestions offered by the study comprised to increasing asset base, attracting competitors to the financial market, and referring to interest rate transmission mechanism channel of monetary policy to influence the credit market in the aforementioned country.

Choi, Eisenbach and Yorulmazer (2015) analyzed the effectiveness of monetary policy in terms of simulating output under the general equilibrium model with financial frictions. Main empirical outcomes suggest that the productivity of investment can be boosted through levering up fulfilled by heterogeneous agents. They found out that more efficient and productive agents take more risks, earn more profit, and invest more. Additionally, heterogeneous agents, compared to less productive ones, are verified to be less responsive to monetary policy that reduces the equilibrium interest rates. This, in turn, deteriorates overall investment quality by dampening monetary stimulus. They also defined that if the effect is strong enough, the monetary policy can lose its effectiveness on output stimulation, which leads to a negative spiral in the economy.

Smant (2002) touched on the question of whether bank credit channel is a necessary part of aggregate monetary transmission mechanism channels or not. The author distinguished between the roles of money and credit creation element and bank loans to the private sector. Empirical outcomes reveal the relationship between monetary policy shocks and volatility in bank loans.

Ghazali and Rahman (2005) investigated the link between bank performance and macroeconomic indicators in Malaysia. Their findings suggest that the central bank affects the credit market through bank lending channels in parallel with the credit channel.

Emons and Sheldon (2002) test the lemons problem based on a sample of new and used cars in the Swiss canton of Basle-City over 1985-1991-time interval. To test the adverse selection, the authors compared the quality of sold and non-sold cars in the sense that the quality is measured by the inspection of vehicle safety. They assumed that the cars which passed the inspection of the vehicle safety at the time they first appeared were of high quality and those that did not are of bad quality. They based the test results for the quality of uncertainty on

the shape of the hazard function concerning car ownership. Hazard function reflects the probability of an even occurring at time t given that it has not been realized until that period. To expand the previous finding on the lemons problem in used car market, this study concluded that privately sold cars are more likely to suffer from defects than a randomly selected vehicle, which verifies an assumption that owners of lemons intentionally put them on sale. The study also found strong evidence in favor of the postulation that buyers of the lemons are not aware of the bad quality of the vehicles, and on this basis, with a high probability, the new owners of the old cars will re-sell the vehicle during the first month after the purchase than later.

In this section of our study, we also consider the studies devoted to the role of monetary policy on bank risk-taking. One of them conducted by Jiménez et al. (2014) manifested the role of an exhaustive credit register of loan applications on credit risk-taking. The results demonstrate that a lower overnight interest rate triggers insufficiently capitalized banks in the financial system.

Weida (2011) investigated the relationship between monetary policy and credit quality in the Chinese banking system, which suggests that expansionary monetary policy mitigates the risk-taking behavior of banks. The main empirical outcome posits that for the banks with higher equity capital, the impact of monetary policy on credit risk is declined. Another finding suggested that city commercial banks are more prone to the monetary policy compared to banks with big size and non-performing loans.

Dang (2020) scrutinized how monetary policy affects bank risk-taking under the multiple-tool regime and found out that monetary policy that increases liquidity injections incentivize banks to take more risk. The author also defined that monetary policy easing contributes to the credit market in terms of deteriorating risks.

Thakor (1996) found strong evidence in favor of the hypothesis, which stated that if the bank is more capital-constrained, the decision of the bank on the lending loan will trigger more so-called "runup" in the stock price of borrowers. He also found out that the effect of monetary policy on lending is ambiguous when credit requirements solely depend on the credit risks.

Bittner et al. (2020) examined the effects of different monetary policy transmission mechanism channels on the supply of credits to firms. They found out that when the credit is lower, tightening monetary policy regimes do not trigger lower deposit rates.

Essid et al. (2010) studied the effect of monetary policy on the yield spread of corporate bonds and defined those unexpected shocks in the Federal funds rate have an insignificant effect on the alterations on credit spread.

Gang and Qian (2015) investigated the relationship between monetary policy and systemic risks in China. The empirical results showed that monetary policy significantly expanded the credit risks even though they had a restricted influence on the economy.

Paligorova and Santos (2012) analyzed monetary policy and bank risk-taking through evidence from the corporate loan market. What is inferred by their findings is that the bank risk-taking behavior is directly associated with the monetary policy, which is believed to incentivize the corporate banks to engage in hazardous financial activities that later deteriorate the soundness of the banking system. The authors demonstrated that banks assign a lower

interest rate to riskier borrowers during times of expansionary monetary policy, while the opposite is true when the monetary policy regime is tightened.

The analysis of the previous literature devoted to the investigation of the lemons problem in housing, labor economics, and the market for used cars revealed that the number of studies conducted on lemons in the credit market is less, which is the gap that our study aims to fill in this research. Almost none of them controlled for the long-run effects of different indicators triggering the lemons problem in the credit market. Thus, we will refer to the VAR and VEC models to address this issue as well.

2. THEORETICAL FRAMEWORK

In this chapter, we will consider the theoretical framework for Akerlof's lemons problem, monetary policy transmission mechanism channels, and finally, the link between those two respectively before settling down our econometric model for the empirical analysis.

2.1. Akerlof's Lemons Market (1970):

Fort the purpose of delineating the essence of the asymmetric information and principal-agent problem, the market for the used cars is provided as a shining example where the author classified cars into the four different categories defined as new, used, good, and bad. It might be the case that the new car is of good quality (peaches) or bad quality (lemon).

The reason for the problem emerges from the existence of asymmetric information, which prevents buyers from differentiating good quality cars from that of bad ones and in view of this, they offer the fixed price, which is the average price for the peaches and price for the lemon. This average price is higher than the price of peaches and lower than the price at which the seller of peaches would agree to sell the car. As a result, those who sell peaches will leave the market as the willingness to pay of the buyers for both cars are lower than the willingness to accept peaches, while the sellers of lemons are happy with the price as it is higher than the real worth of what they are offering. Thus, the pool of peaches will sharply deteriorate, and only lemons will exist in the car market eventually.

The "lemon" is one of the outstanding American slangs which signifies cars with bad quality which remains undetectable until someone purchases them. Theoretical formulation of the lemons problem includes the supply of the cars, which is merely defined by the price, and the demand, which depends on both price and quality of the cars in the market.

$\frac{P_{lemon}+P_{peach}}{2} = O$ where $P_{lemon} < O < P_{peach}$ and O is the offer price of the buyer to the car regardless of its quality which cannot be detected due to the information asymmetry problem. As a response to the buyer, the seller will have the following options:

$$\text{Sell the car if } \begin{cases} O > P_{peach}, if\ the\ car\ is\ peach \\ O > P_{lemon}, if\ the\ car\ is\ lemon \end{cases}$$

The market demand will be achieved once the demand and supply can be married together as S(p)=D(p, μ) where S stands for supply which is only defined by the price (p), and D denotes demand which is counted on price and quality of the car (μ).

2.2. Monetary Policy Transmission Mechanism Channels:

Based on findings of Mishkin et al. (2013) and considering an effect of a contractionary monetary policy on the economy, the monetary policy transmission mechanism channels to be considered are as follows:

Interest rate channel

Being the key monetary policy transmission mechanism channel in Keynesian model, transmission of monetary policy via interest rate has been scrutinized for the last half of the century in the literature of monetary policy. The benchmark Keynesian model defined the interest rate channel in the following way: Decrease in money supply shifts the vertical curve in the money market to the left, which in turn increases the interest rate in the economy. Given this higher interest rate after the contractionary monetary policy, the investment spending will deteriorate in the economy as the cost of borrowing is now higher than it used to be prior to the policy change made by a central bank. Considering that investment denoted by I is the second-largest share of GDP of an economy, the aggregate output will be negatively affected in response to the decline in investment spending.

Exchange rate channel

As the US economy became more internationalized together with the implementation of flexible exchange rates, the undeniable role of monetary policy passing through the effect of exchange rate transmission channel on the net export gained more interest. This is the channel from which the interest rate channel is believed to emerge. To comprehend this relationship more clearly, assume that there is a contractionary monetary policy because of which the interest rates will increase. The increase in the interest rates will make the domestic currency denominated assets more appealing, and thus, the demand for the domestic currency will increase. Given this scenario, the domestic currency will gain value against a foreign currency which is also known as an appreciation of the domestic currency. The appreciation will make the domestically produced goods and services extremely expensive in comparison to the commodities, goods, and services produced abroad. Eventually, the net export will deteriorate in the domestic economy given that the export will decline, and imports will increase in response to the appreciation of the domestic currency, which makes the same basket of domestically produced goods more expensive than that of foreign ones.

Tobin's q theory

The aforementioned theory is basically about the way monetary policy affects the economy through its influence on the stock valuation. Here q denotes the ratio of the market value of the firm to the replacement cost of capital. Whenever q turns out to be higher than 1, then it means that the stocks of the company are overvalued in the market such that new investment facilities and equipment are cheaper than the market value of a firm. In other words, if the company is planning to make a new investment, then it can issue stocks to raise funding which can be spent on the new investment equipment. In this case, the opposite is true, which suggests that q is less than 1, it is said that the stocks issued by the company are undervalued as the replacement cost of capital is dominates the market value of a firm, which signifies that the company cannot buy new equipment or investment facilities by selling its stocks as the demand for them will be lower. Contractionary monetary policy increases the interest rates on bonds which basically expands the demand for the mentioned asset. Given the higher demand for bonds, the demand for stocks will decline, and their prices will be negatively influenced. As the price of stock deteriorates, the market value of a firm or company will do so as well, and thus, the q will become lower than 1. Due to the q lower than 1, the company will not be able to make an investment, and as a result, the investment spending will decline, which negatively influences the aggregate output in the economy.

Wealth effects

From the Life Cycle Hypothesis of Consumption, Franco Modigliani introduced a new channel named wealth effects which comprised the effect of monetary policy on the economy through the effect of households' balance sheet on their investment decision. It basically acclaimed that a contractionary monetary policy will negatively affect the wealth of households as the increasing interest rate on bonds will disincentivize holding stocks, which deteriorates the wealth of those holding stocks. Given the decline in the market value of stocks, the consumption habits of households will be negatively affected as well. A decline in consumption will undoubtedly reduce the aggregate output in the economy in the end.

Bank lending channel

Considering the role of banks in the financial markets in terms of effectively and efficiently solving the asymmetric information problem, another transmission mechanism channel was established, which suggested that a contractionary monetary policy declines the monetary base so as the total amount of available money to be treated as bank deposits. A decline in bank deposits restricts commercial banks to loan out more money to households, business owners, and investors. Hence, the amount of investment spending will decline, and the aggregate output will decrease in the domestic economy.

Balance sheet channel

The balance sheet channel is assumed to be the main reason why the importance of the bank lending channel fades away. Consider the following scenario: a decrease in money supply leads to an increase in the interest rate on bonds. The value of stocks of firms and companies will be underrated, and it will deteriorate the net worth of firms. This, in turn, will invigorate the adverse selection and moral hazard issued that prevent the allocation of scarce financial resources to the most efficient users in the market, which will yield a decline in lending, investment spending, and aggregate output.

Cash flow channel

Reflecting the difference between cash receipts and cash payments of firms, the cash flow channel suggests that any positive alteration in the amount of cash flow will decline the adverse selection and moral hazard risk in the financial market. Thus, it can be inferred that a decline in the monetary base will negatively influence the cash flow in the economy and give rise to adverse selection accompanied by the moral hazard issue that declines lending, investment spending and finally, aggregate output in the economy.

Unanticipated price level channel

Contractionary monetary policy increases interest rates and declines prices in the economy. With the lower price level in mind, households and the other market decision-makers will have lower inflationary expectations. This will harm the net worth of firms and increase the probability of both adverse selection and moral hazard problems to occur, which leads to deterioration of lending, investment, and aggregate output in the economy.

Household liquidity effects

Contractionary monetary policy declines the market value of stocks as well as the properties owned by the households. This negative change will increase the likelihood of financial

distress in the economy, and durable expenditure pertaining to households will deteriorate. As a result, the aggregate output in the economy will tend to decline over time.

2.3. Lemon's problem and monetary policy transmission mechanisms:

In this subsection, we will mainly manifest the hypotheses to be tested in our study. The main hypotheses are that factors that positively (negatively) influence the lemons (peaches) will negatively (positively) affect the peaches (lemons) in the cointegration equation of the long-run model derived from VEC.

3. DATA DESCRIPTION

Table 1 provides the descriptive data statistics for both dependent and independent variables in our sample for the 2006-2017 time interval.

Table 1: Descriptive summary statistics of data sample

Variable Name	Observations	Mean	Std. Dev	Min	Max	Source
		Time Interval				
Year (t)	12	2011.5	3.61	2006	2017	-
		Dependent Variable in Main Models				
Lemons (Overdue loans)	12	741.14	557.56	77.7	1626.7	CBAR
Peaches (Total loans-overdue loans)	12	10742.11	5284.69	2285	20221.9	CBAR
		Dependent Variable in Robustness Test				
The Ratio of Non-performing Loans to Total Gross Loans (NPTGL) as a proxy for Lemons	12	5.25	.51	4.8	6.5	FRED
		Monetary Transmission Channels				
Private Credit by Deposit Money Banks to GDP (X1)	12	20.41	8.56	8.88	35.66	CBAR
Central Bank Assets to GDP (X2)	12	2.95	2.05	.44	6.09	CBAR
Real Effective Exchange Rate (REER)	12	95.77	15.31	65.5	111.3	CBAR
log_REER	12	1.98	.08	1.81	2.04	CBAR
Real Interest Rate (RIR)	12	10.89	15.87	-6.41	48	CBAR
Deposit Interest Rate (DIR)	12	10.29	1.50	7.73	12.22	CBAR
Lending Interest Rate (LIR)	12	18.44	1.33	16.40	20.7	CBAR
House Prices in Secondary Market (SHP)	12	1420.83	322.60	976	2057	CBAR
House Prices in Primary Market (PHM)	12	923.58	160.66	731	1279	CBAR
Inflationary Expectations (IE)	12	4.62	2.68	2.5	12.2	CBAR

***Note**: CBAR stands for The Central Bank of Azerbaijan Republic (www.cbar.az)*

In our models, we proxy the overdue loans and the ratio of non-performing loans to the total-gross loans for lemons which denote the bad quality credits, while we used Peach, which is obtained by substracting overdue loans from total loans, for credits of high quality. To control for the effects of transmission mechanism channels of monetary policy, we referred to the aforementioned explanatory variables. To account for the traditional interest rate channel, we include real interest rate in our model while real effective exchange rate will denote the exchange rate channel of monetary transmission mechanisms. We include deposit interest rate or interest rate on deposits to measure the effect of monetary policy through bank lending

channel, whereas we specify the lending interest rate for the balance sheet channel. Furthermore, we controlled for the effect of unexpected price level channels through inflationary expectations. The data source is the Central Bank of Azerbaijan Republic and FRED, where we obtained the data on the ratio of Non-performing Loans to Total Gross Loans (NPTGL).

Additionally, we controlled for the effect of house prices in primary and secondary markets as a sign of household liquidity effects that influence the financial wealth in the economy. Given that the stock market has not been developed yet in Azerbaijan, we could not measure the effect of monetary policy through Tobin's q Theory and wealth effects transmission mechanism channels. Graphical representations of the time series used in our VAR and VEC models are provided in the Appendixes Section.

4. METHODOLOGY

In order to estimate the short and long-run effect of monetary policy transmission mechanism channels on good and bad quality loans in the credit market of Azerbaijan, along with defining the cointegration of variables, we refer to VAR and VEC models analysis for the 2006-2017 time horizon.

For the sake of simplicity, we assume that there are two variables, dependent and independent, for which we have to construct the following equations:

4.1. VEC Model

$$y_t = \beta_{y0} + \beta_{yy_1} y_{t-1} + \cdots + \beta_{yy_p} y_{t-p} + \beta_{yx1} x_{t-1} + \beta_{yx_p} x_{t-p} + \varepsilon_t^y$$

$$x_t = \beta_{x0} + \beta_{xy_1} y_{t-1} + \cdots + \beta_{xy_p} y_{t-p} + \beta_{xx1} x_{t-1} + \beta_{xx_p} x_{t-p} + \varepsilon_t^x$$

In our case, we will have nine such equations for lemons and peaches separately, which adds up to 18 equations in total. Once we consider NPTGL as a proxy for lemons in the robustness test, we will have to construct nine such equations for that model as well.

4.2. VAR Model

$$\Delta y_t = \beta_{y_0} + \beta_{y_1} \Delta y_{t-1} + \cdots + \beta_{y_p} \Delta y_{t-p} + \gamma_{y_1} \Delta x_{t-1} + \cdots + \gamma_{y_p} \Delta x_{t-p} - \lambda_y (y_{t-1} - \alpha_0 - \alpha_1 x_{t-1}) + \varepsilon_t^y$$

$$\Delta x_t = \beta_{x_0} + \beta_{x_1} \Delta y_{t-1} + \cdots + \beta_{x_p} \Delta y_{t-p} + \gamma_{x_1} \Delta x_{t-1} + \cdots + \gamma_{x_p} \Delta x_{t-p} - \lambda_x (y_{t-1} - \alpha_0 - \alpha_1 x_{t-1}) + \varepsilon_t^x$$

Again here, we will need to write down nine equations, which we skip in order to save more space and be more focused on empirics rather than theories.

5. EMPIRICAL RESULTS AND DISCUSSIONS

In this section, we will demonstrate the estimation results of VAR and VEC models along with their corresponding graphical representations. Through the Impulse Response Functions (IRF), the effects of shocks pertaining to the monetary policy transmission mechanism channels on lemons and peaches for the credit market of Azerbaijan were delineated. The supplementary findings of VAR and VEC models are provided in the Appendixes section of this study.

5.1. Vector Error Correction Model

Table 2 manifests the estimation results of cointegrating equations for the long-run derived from the Vector Error Correction (VEC) model. We provide the estimation results for the lemons by using two different dependent variables while we control for the effect of the same indepen-

dent variables in our models. In the first model, we estimated the long-run cointegration between transmission mechanism channels and lemons based on the dependent variable of overdue loans whose data is provided by the Central Bank of Azerbaijan Republic (CBAR). For peaches, we substracted the overdue loans from the total amount of loans to proxy for the peaches in our models.

Table 2: Estimation Results of Cointegrating Equations for the Long-run Model

Model 1	**Lemons (Overdue Loans)**		***Model 2*** **Lemons (NPTGL)**		***Model 3*** **Peaches**	
Variables	***Coefficient***	***P-value***	***Coefficient***	***P-value***	***Coefficient***	***P-value***
Log_dependent variable	1	.	1	.	1	.
X1	-46.10***	0.000	-0.32***	0.000	-172.98***	0.000
X2	-68.42***	0.000	0.99***	0.000	-1866.21***	0.000
log_REER	-2738.52***	0.000	-18.58***	0.000	24367.02***	0.000
SHP	0.32***	0.000	0.004***	0.000	-7.41***	0.000
DIR	-111.92***	0.000	-0.43***	0.000	336.24	0.104
LIR	120.25***	0.000	1.10***	0.000	-947.38***	0.000
RIR	4.41***	0.000	0.09***	0.000	-42.53***	0.000
IE	-34.20***	0.000	0.30***	0.000	315.20***	0.001
Constant	4508.20***	.	10.93***	.	-26287.56	.
Parms	8		8		8	
chi2	17105.12		1344.495		11727.55	
P>chi2	0.0000		0.0000		0.0000	

Note: **, **, and *** stan for p<0.10, p<0.05, and p<0.01 respectively*

Continuing with the interpretation of the results in Table 2, we start with Model 1, where the dependent variable is overdue loans. As we can see from the sign of coefficient from X1, which denotes Private Credit by Deposit Money Banks to GDP, the effect of an increase in the given variable is negative on the overdue loans in the long-run. The corresponding coefficient of X2, which signifies Central Bank Assets to GDP, represents the negative cointegration between assets to GDP ratio and bad quality loans in the long-run. It implies that as the asset to GDP ratio in the central bank increases, the aggregate lemons will deteriorate in the economy of Azerbaijan. It also manifests the effectiveness of asset tranmission mechanism channels through which the monetary policy can influence the lemons in the credit market. The same negative sign appears for the logarithmic transformation of the real effective exchange rate channel, which represents the traditional exchange rate channel. It can be inferred that an increase in or appreciation of the real effective exchange rate channel will deteriorate the lemons in the long-run while it improves the amount of peaches in the long-run as it is reflected in the positive coefficient of the aforementioned explanatory variable in Model 3.

Coming to the effect of monetary policy through the household liquidity channel, we included the house price in the secondary market whose corresponding coefficient turned out to have a positive effect on lemons, which entails that any change in monetary policy that leads to an increase in the house price in the secondary market will yield a higher probability of financial distress and this, in turn, will generate more lemons in the economy as people receiving credits will not be able to pay for their indebtedness on time. The interest rate on deposits is estimated to have a negative effect on lemons in the long-run, while it has a positive effect on peaches as we derived from Model 3. The negative effect of interest rates on deposits is verified in the robustness check that is demonstrated in Model 2, where we proxied the ratio of non-profit

loans to total gross loans for the lemons in the credit market. The effect suggests that any change in monetary policy that causes an increase in the interest rate on deposits will lead to a decline in the amount of lemons, which is desirable. There is a negative cointegration between the interest rate on lending and the lemons in the long-run, which can be associated with the fact that as the probability of the loan turning into overdue loan increases, the interest rate attached to the lending will also go up. Thus, in the long-run, any monetary policy change leading to the increase in the interest rate on lending will deteriorate peaches as can be seen from the coefficient of LIR in Model 3, while the amount of lemons will be boosted. Coming to the effect of the interest rate channel denoted by the real interest rate, its effect on lemons and peaches is estimated to be positive and negative, respectively. On this basis, we derive that an effect of a monetary policy through a traditional interest rate transmission mechanism channel will improve the amount of good quality loans in the credit market. What can be ascertained regarding the effect of a monetary policy through the unanticipated price level channels is that there is a negative cointegration between inflationary expectations and lemons once we consider overdue loans as a proxy for the lemons. The sign of the coefficient changes if the dependent variable is the ratio of non-performing loans to the total gross loans such that there will be a positive cointegration between lemons and inflationary expectations.

When we compare the estimation results of Model 1 and Model 2, we can see that the sign of the coefficients is the same for the majority of the independent variables except for the Central Bank Assets to GDP (X2) and Inflationary Expectations (IE). The sign of the coefficient of X2 in Model 2 suggests that there is a positive cointegration between Central Bank Assets to GDP and the lemons. Coming to the sign of the coefficient of inflationary expectations, it suggests that the effect of monetary policy on the lemons through unexpected price level transmission channels will be positive in the long-run.

Now we switch to interpreting the estimation results for Model 3, in which the explained variable is the good quality loans denoted by the peaches. One of the most engrossing points of the estimation results is that the signs of the coefficients of X1 and X2 have to be changing once we move from Model 1 to Model 3. However, the estimated negative signs are consistent across the two models. It happens only in the case of the aforementioned explanatory variables such that for the remaining independent variables, the signs alternate once we move from Model 1 to Model 2. The main takeaway from this result is that Private Credit by Deposit Money Banks to GDP (X1) and Central Bank Assets to GDP (X2) negatively cointegrate with both lemons and peaches in the long-run. DIR, IE, and the logarithm of REER have a positive cointegration with the peaches in the long-run, suggesting that monetary policy that activates the bank lending channel, unexpected price level channel, and exchange rate channel will improve the peaches in the credit market. However, the balance sheet channel, household liquidity channel, and traditional interest rate channel deteriorates the good quality loans in the credit market of Azerbaijan.

Our long-run error correction model for lemons according to Model 1 will look like as follows:

$$ECT_{t-1} = 1 * Lemons - 46.10 * X1 - 68.42 * X2 - 2738.52 * \log\_REER + 0.32 * SHP - 111.92 * DIR + 120.25 * LIR + 4.41 * RIR - 34.20 * IE + 4508.20$$

Our long-run error correction model for peaches will look like as follows:

$$ECT_{t-1} = 1 * Peaches - 172.98 * X1 - 1866.21 * X2 - 24367.02 * \log\_REER - 7.41 * SHP - 336.24 * DIR - 947.38 * LIR - 42.53 * RIR + 351.20 * IE - 26287.56$$

5.2. VAR Model

In this subsection, we will demonstrate the graphical representations along with the corresponding tables of estimation results for the VAR model. Based on the interpretation of IRFs, we will provide policy recommendations and conclusions in a separate section of the study.

Table 3 depicts the estimation results for the VAR model in three different columns where the dependent variables are overdue loans, the ratio of non-performing loans to total gross loans, and total loans minus overdue loans. The model enables us to see how variables, including their lagged values as well, affect one another over time and whether this effect is statistically significant or not.

Table 3: Estimation results of VAR model

	Model 1		***Model 2***		***Model 3***	
	Lemons (Overdue Loans)		**Lemons (NPTGL)**		**Peaches**	
Variables	***Coefficient***	***P-value***	***Coefficient***	***P-value***	***Coefficient***	***P-value***
DepVar						
DepVar						
L1.	-1.05***	0.000	(omitted)		0.48***	0.000
L2.	-1.20***	0.000	(omitted)		2.50***	0.000
X1						
L1.	90.64***	0.000	0.03***	0.000	-539.08***	0.000
L2.	245.30***	0.000	0.23***	0.000	-1020.91***	0.000
X2						
L1.	(omitted)		-0.40***	0.000	(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
log_REER						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
RIR						
L1.	18.36***	0.000	0.01***	0.000	37.30***	0.000
L2.	-16.56***	0.000	-0.01***	0.000	57.39***	0.000
SHP						
L1.	0.10***	0.000	-0.001***	0.000	2.61***	0.000
L2.	-2.92***	0.000	-0.002***	0.000	-7.06***	0.000
DIR						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
LIR						
L1.	(omitted)		(omitted)		(omitted)	
L2.	0		(omitted)		(omitted)	
IE						
L1.	-208.66		-0.313***	0.000	(omitted)	
L2.	(omitted)				-1186.92***	0.000
constant	1049.90	.	7.70	.	20762.32	.
X1						
DepVar						
L1.	-0.01***	0.000	(omitted)		-0.0001***	0.000
L2.	-0.001***	0.000	(omitted)		0.002***	0.000
X1						
L1.	1.41***	0.000	1.42***	0.000	0.66***	0.000
L2.	1.02***	0.000	1.18***	0.000	-1.20***	0.000
X2						
L1.	(omitted)		-1.75***	0.000	(omitted)	
L2.	(omitted)		(omitted)		(omitted)	

log_REER						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
RIR						
L1.	-0.13***	0.000	0.17***	0.000	-0.018***	0.000
L2.	0.10***	0.000	-0.12***	0.000	0.042***	0.000
SHP						
L1.	0.009***	0.000	0.01***	0.000	0.01***	0.000
L2.	-0.023***	0.000	-0.03***	0.000	-0.008***	0.000
DIR						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
LIR						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
IE						
L1.	-1.80***	0.000	-2.43***	0.000	(omitted)	
L2.	(omitted)		0.40***	0.000	-0.90***	0.000
constant	10.16	.	18.56		10.61	.
X2						
DepVar						
L1.	0.001***	0.000	(omitted)		0.001***	0.000
L2.	-0.01***	0.000	(omitted)		-0.000***	0.000
X1						
L1.	0.10***	0.000	-0.48***	0.000	-0.999***	0.000
L2.	1.30***	0.000	0.51***	0.000	0.600***	0.000
X2						
L1.	(omitted)		0.83***	0.000	(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
log_REER						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
RIR						
L1.	0.13***	0.000	0.03***	0.000	-0.007***	0.000
L2.	-0.10***	0.000	0.02***	0.000	0.023***	0.000
SHP						
L1.	0.00***	0.000	0.003***	0.000	-0.0003***	0.000
L2.	-0.015***	0.000	0.003***	0.000	0.006***	0.000
DIR						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
LIR						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
IE						
L1.	-1.44***	0.000	-0.41***	0.000	(omitted)	
L2.	(omitted)		-1.25***	0.000	-1.74***	0.000
constant	9.79	.	-1.62	.	-0.42	.
log_REER						
DepVar						
L1.	-0.00***	0.000	(omitted)		-0.000***	0.000
L2.	0.000***	0.000	(omitted)		0.000***	0.000
X1						
L1.	-0.000***	0.000	0.002***	0.000	-0.021***	0.000
L2.	0.039***	0.000	0.05***	0.000	-0.036***	0.000
X2						

L1.	(omitted)		-0.10***	0.000	(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
log_REER						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
RIR						
L1.	0.004***	0.000	0.01***	0.000	0.0001***	0.000
L2.	-0.002***	0.000	-0.003***	0.000	0.002***	0.000
SHP						
L1.	-0.00006***	0.000	-0.000***	0.000	-0.0000008***	0.000
L2.	-0.0004***	0.000	-0.000***	0.000		0.000
DIR						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
LIR						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
IE						
L1.	-0.056***	0.000	-0.08***	0.000	-0.022***	0.000
L2.	(omitted)		0.02***	0.000	(omitted)	
constant	2.40	.	2.74		2.45	.
RIR						
DepVar						
L1.	0.06***	0.000	(omitted)		0.002***	0.000
L2.	0.11***	0.000	(omitted)		-0.01***	0.000
X1						
L1.	-12.01***	0.000	-5.71***	0.000	-4.53***	0.000
L2.	-7.33***	0.000	-0.02***	0.000	7.43***	0.000
X2						
L1.	(omitted)		7.22***	0.000	(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
log_REER						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
RIR						
L1.	-1.15***	0.000	-0.45***	0.000	0.04***	0.000
L2.	0.42***	0.000	-0.46***	0.000	-0.97***	0.000
SHP						
L1.	0.10***	0.000	0.088***	0.000	0.10***	0.000
L2.	0.21***	0.000	0.071***	0.000	0.01***	0.000
DIR						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
LIR						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
IE						
L1.	12.04***	0.000	6.54***	0.000	(omitted)	
L2.	(omitted)		10.15***	0.000	13.10***	0.000
constant	-233.73	.	-186.11	.	-159.03***	.
SHP						
DepVar						
L1.	-1.84***	0.000	(omitted)		-0.14***	0.000
L2.	2.19***	0.000	(omitted)		0.52***	0.000
X1						
L1.	101.24***	0.000	240.50***	0.000	120.30***	0.000

L2.	-66.30***	0.000	144.67***	0.000	-413.8***	0.000
X2						
L1.	(omitted)		-494.70***	0.000	(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
log_REER						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
RIR						
L1.	5.83***	0.000	37.44***	0.000	-2.40***	0.000
L2.	3.11***	0.000	-25.20***	0.000	13.35***	0.000
SHP						
L1.	-0.47***	0.000	-1.33***	0.000	-0.64***	0.000
L2.	-1.10***	0.000	-6.33***	0.000	-1.63***	0.000
DIR						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
LIR						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
IE						
L1.	-167.22***	0.000	-518.85***	0.000	(omitted)	
L2.	(omitted)		368.30***	0.000	117.17***	0.000
constant	3580.291	.	7725.889	.	5754.357	.
DIR						
DepVar						
L1.	-0.001***	0.000	(omitted)		-0.0003***	0.000
L2.	-0.002***	0.000	(omitted)		-0.0003***	0.000
X1						
L1.	-0.10***	0.000	-0.26***	0.000	0.06***	0.000
L2.	0.03***	0.000	-0.16***	0.000	0.19***	0.000
X2						
L1.	(omitted)		-0.033***	0.000	(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
log_REER						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
RIR						
L1.	-0.003***	0.000	-0.025***	0.000	0.02***	0.000
L2.	-0.001***	0.000	0.022***	0.000	-0.006***	0.000
SHP						
L1.	0.001***	0.000	0.002***	0.000	0.003***	0.000
L2.	0.0002***	0.000	0.004***	0.000	-0.001***	0.000
DIR						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
LIR						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
IE						
L1.	0.36***	0.000	0.55***	0.000	(omitted)	
L2.	(omitted)		-0.29***	0.000	0.11***	0.000
constant					9.28	.
LIR						
DepVar						
L1.	-0.002***	0.000	(omitted)		-0.0004***	0.000
L2.	-0.000***	0.000	(omitted)		0.0001***	0.000

X1						
L1.	-0.16***	0.000	-0.15***	0.000	0.04***	0.000
L2.	-0.004***	0.000	0.03***	0.000	-0.09***	0.000
X2						
L1.	(omitted)		-0.42***	0.000	(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
log_REER						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
RIR						
L1.	0.007***	0.000	0.018***	0.000	0.03***	0.000
L2.	0.000***	0.000	-0.006***	0.000	-0.0004***	0.000
SHP						
L1.	0.001***	0.000	0.0004***	0.000	0.002***	0.000
L2.	0.003***	0.000	0.001***	0.000	0.0006***	0.000
DIR						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
LIR						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
IE						
L1.	0.24***		0.08***	0.000	(omitted)	
L2.	(omitted)		0.10***	0.000	0.26***	0.000
constant					18.21	.
IE						
DepVar						
L1.	0.01***	0.000	(omitted)		0.001***	0.000
L2.	-0.003***	0.000	(omitted)		-0.002***	0.000
X1						
L1.	0.38***	0.000	0.16***	0.000	0.36***	0.000
L2.	-0.97***	0.000	-1.40***	0.000	0.51***	0.000
X2						
L1.	(omitted)		1.99***	0.000	(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
log_REER						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
RIR						
L1.	-0.15***	0.000	-0.23***	0.000	-0.11***	0.000
L2.	0.02***	0.000	0.08***	0.000	-0.04***	0.000
SHP						
L1.	-0.001***	0.000	0.0004***	0.000	-0.003***	0.000
L2.	0.01***	0.000	0.024***	0.000	0.01***	0.000
DIR						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
LIR						
L1.	(omitted)		(omitted)		(omitted)	
L2.	(omitted)		(omitted)		(omitted)	
IE						
L1.	0.60***	0.000	1.58***	0.000	(omitted)	
L2.	(omitted)		-0.85***	0.000	-0.20***	0.000
constant	-6.08		-18.36	.	-11.27	.
Information Criterias for the Models						
AIC	-530.6562		-547.4239		-530.0023	

HQIC	-533.6436	-550.4113	-532.9897
SBIC	-527.9329	-544.7007	-527.279
Number of observations	10	10	10
Log likelihood	2743.281	2827.12	2740.012

Note: *, **, and *** stan for p<0.10, p<0.05, and p<0.01 respectively

Given that it is difficult to interpret the coefficients in Table 3, we refer to the IRFs in rder to explain the effect of shocks to the lemons and peaches. Considerig the possibility that the errors might be correlated, we applied orthogonolized irf, which suggests that ordering matters in a sense that shocks to the dependent variable affects both the dependent and independent variable at time t. However, one should bear in mind that the shock to the independent variable influences the only independet variable itself at time t.

Figure 1: Impulse response function for the effect of private credit by deposit money banks to GDP on lemons

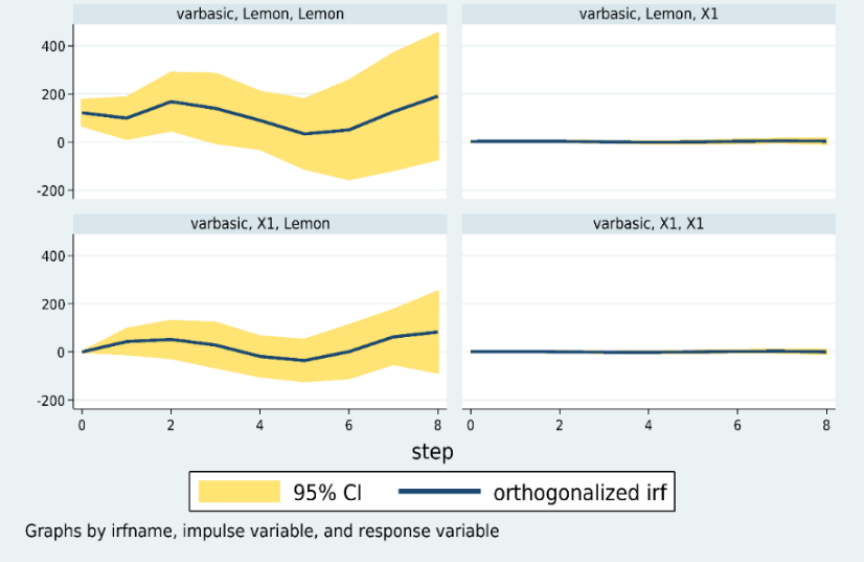
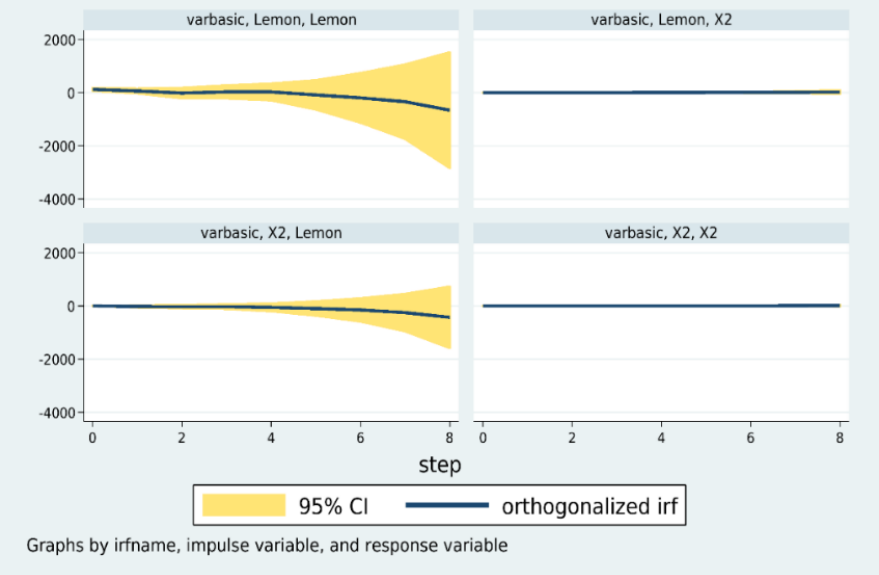


Figure 2: Impulse response function for the effect of central bank assets to GDP on lemons



We start with an interpretation of Figure 1, where our main interest is the second-row first column that demonstrates the impact of X1 shock on the time-path of Lemons. We can see that a current positive shock to the X1 will incrementally increase the amount of lemons, yet the effect will not be persistent as it shortly converges to zero. After $t = 4$, the effect gradually becomes negative but, later on, exceeds zero meagerly. Regarding Figure 2, we again pay attention to the second raw and the first column, where the impact of X2 shock on the time-path of Lemons is portrayed. What we can observe from this part of graphical representation is that the initial effect of a current increase in X2 will have a constant effect, which is 0, for a long time, and the effect tends to decline and become slightly negative only in the long run after $t = 6$.

Regarding Figure 3, we can see that an initial impact of the logarithm of real effective exchange rate shock on the lemons is upward sloping with an initial effect of zero in the short-run. As we move into the long-run, the effect becomes positive, especially after the t=4.

Figure 3: Impulse response function for the effect of real effective exchange rate on lemons

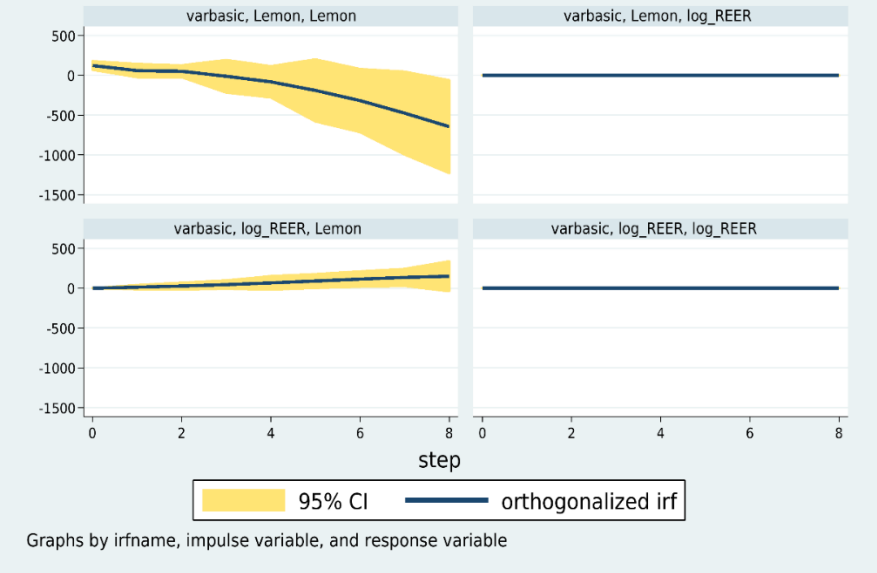
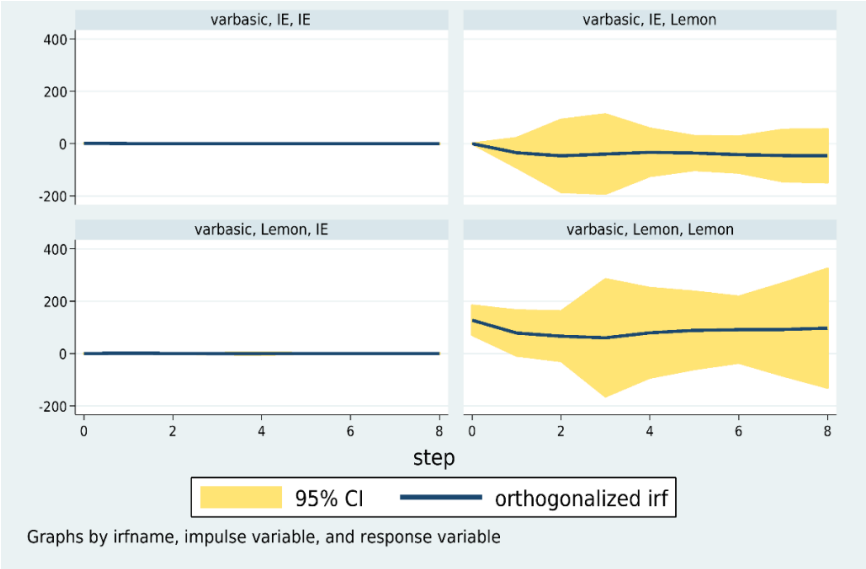


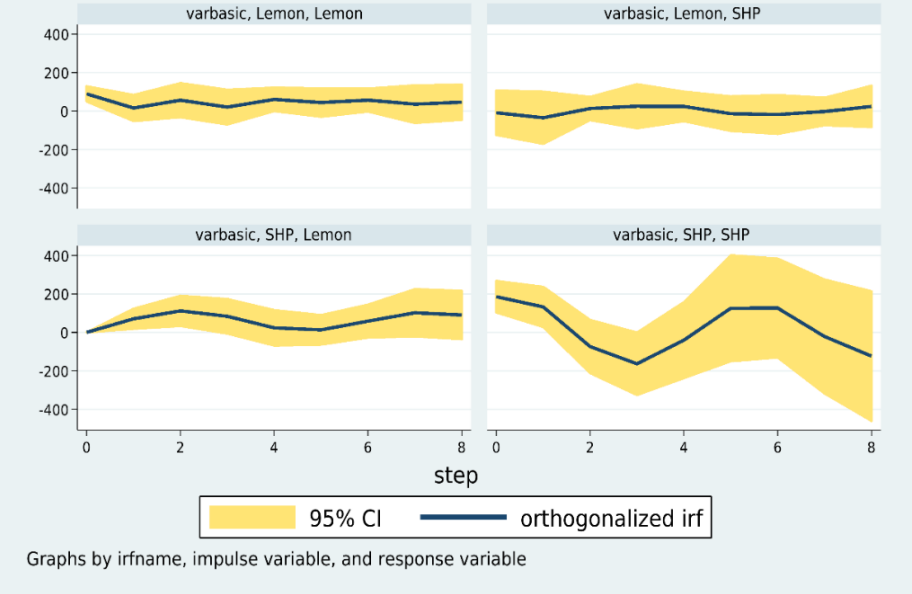
Figure 4: Impulse response function for the effect of inflationary expectations on lemons



When it comes to the effect of inflationary expectations shock on the lemons, it can be inferred that once the inflationary expectations increase, it will have a negative effect on the lemons initially. But this effect will not be persistent as it will gradually converge to zero in the long-run.

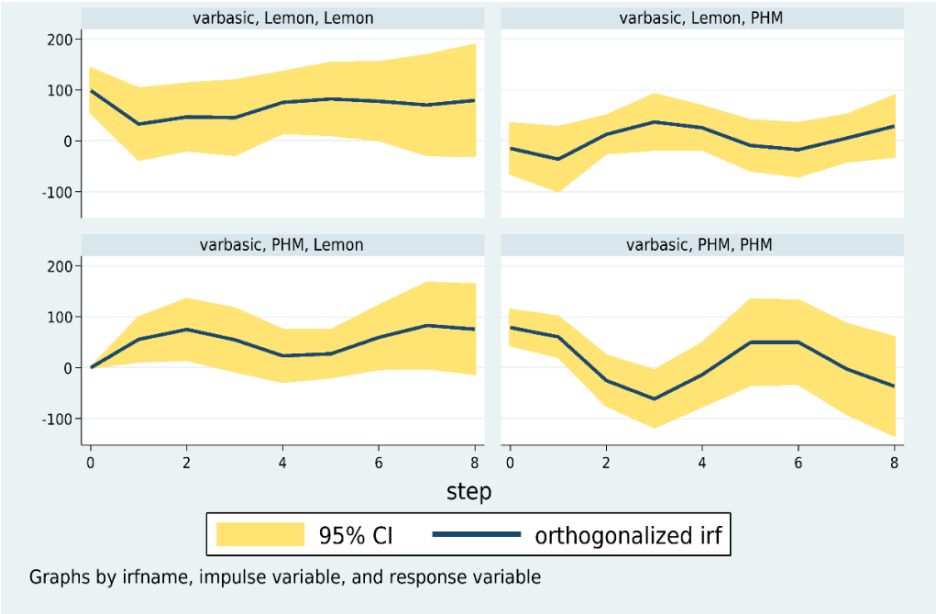
A positive shock to the house prices in the secondary market will initially increase the lemons until $t = 2$ after which the effect will gradually decline yet stay positive before we hit $t = 4$. After $t = 6$, the effect of shock will become more visible and higher than zero in the long-run.

Figure 5: Impulse response function for the effect of secondary market house price on lemons



We can see exactly the same effect of a shock to the house price in the primary market on the lemons. However, the difference here is that the effect is more statistically significant and higher than what we had in the case of house price in the secondary market.

Figure 6: Impulse response function for the effect of primary market house price on lemons



The effect of a shock to the interest rates on deposits to the lemons will have a negative effect that is persistent and concave up. It suggests that until approximately $t = 5$ the effect will be negative and declining, but after the aforementioned time period, it will increase yet could not proceed beyond zero.

Finally, we analyze the effect of a shock to the interest rate on the lending equation to the time horizon of lemons and see that the effect is zero, persistent, but not statistically significant.

Figure 7: Impulse response function for the effect of deposit interest rate on lemons

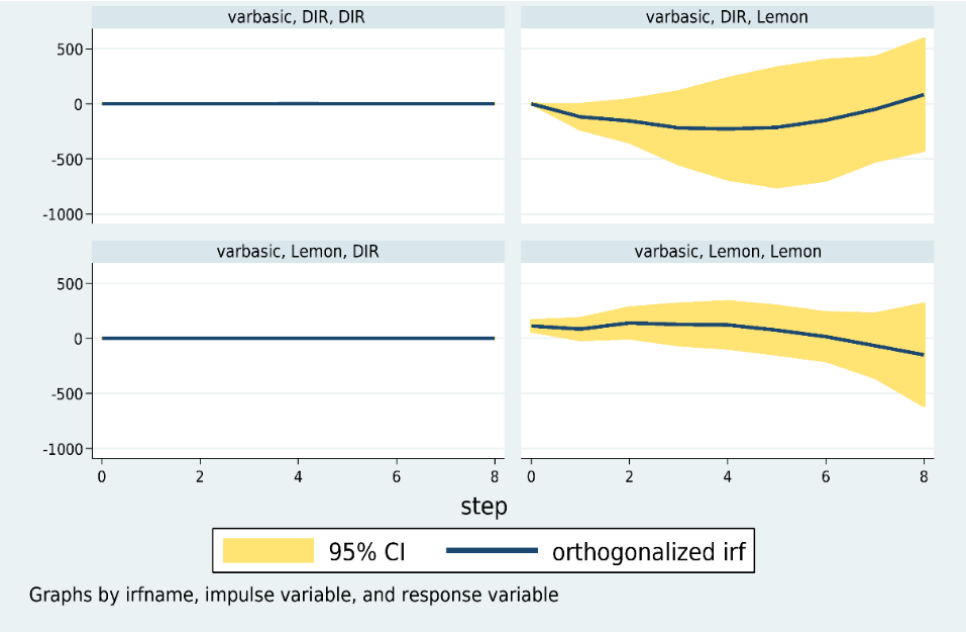


Figure 8: Impulse response function for the effect of lending interest rate on lemons

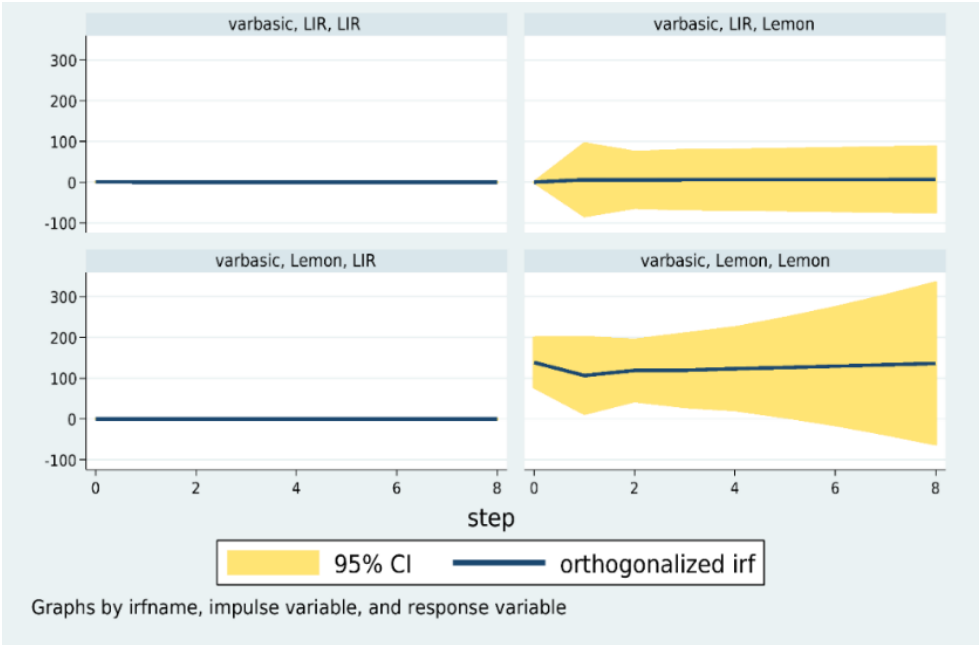
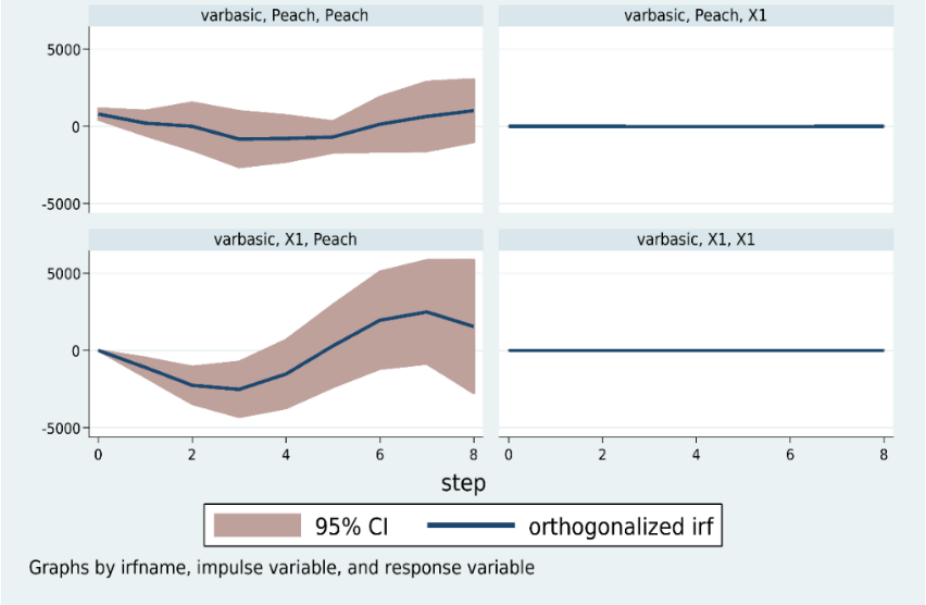


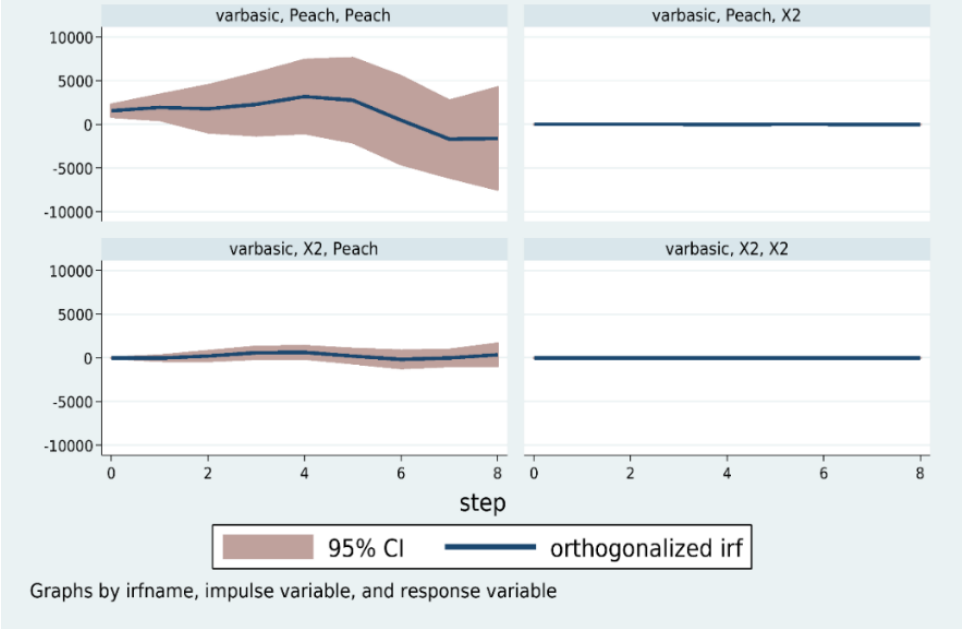
Figure 9: Impulse response function for the effect of private credit by deposit money banks to GDP on peaches



From here on, we will analyze the IRFs for peaches through Figure 9 to Figure 16. We start with an effect of a positive shock to X1 on the time horizon of Peaches. We can infer that the effect of one standard deviation shock to the X1 will have a negative effect on peaches in the short-run, and the effect will persist until we reach $t = 4$.

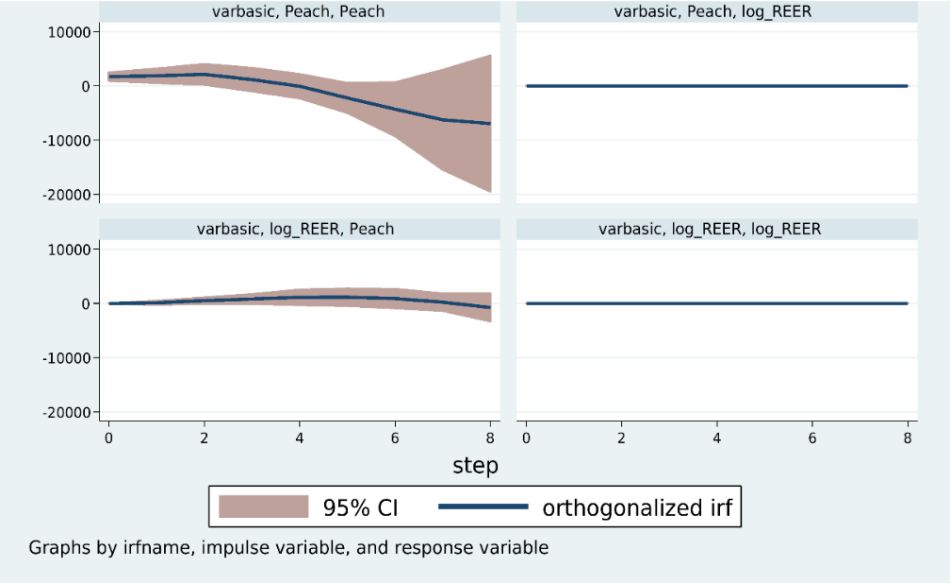
In the medium-run that can be denoted with t∈ [4,6], the effect will become positive and increase gradually. In the long-run, the effect will start declining again, but it will not go below zero.

Figure 10: Impulse response function for the effect of central bank assets to GDP on peaches



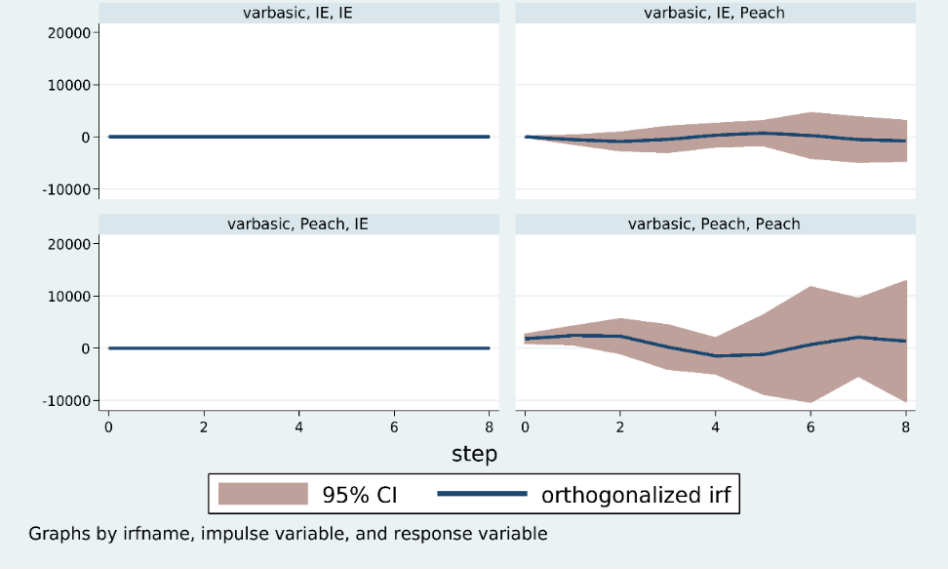
Now we come to the effect of onestandard deviation increase in X2 on peaches, which suggests that the effect is zero in the short-run, and it gradually increases in the medium-run. From $t = 4$ to $t = 6$, the effect slightly declines but in the long-run, it slightly increases and exceeds zero incrementally.

Figure 11: Impulse response function for the effect of real effective exchange rate on peaches



From Figure 11, we can see that the effect of a shock to the log of REER on peaches in the short run is zero, whereas it slightly increases in the medium-run and starts declining in the long-run again. Regarding the effect of a shock to inflationary expectations on the peaches that are portrayed in Figure 12, we can see that the effect is negative in the short-run, gradually increasing in the medium-run, and finally, declining and becoming negative in the long-run.

Figure 12: Impulse response function for the effect of inflationary expectations on peaches



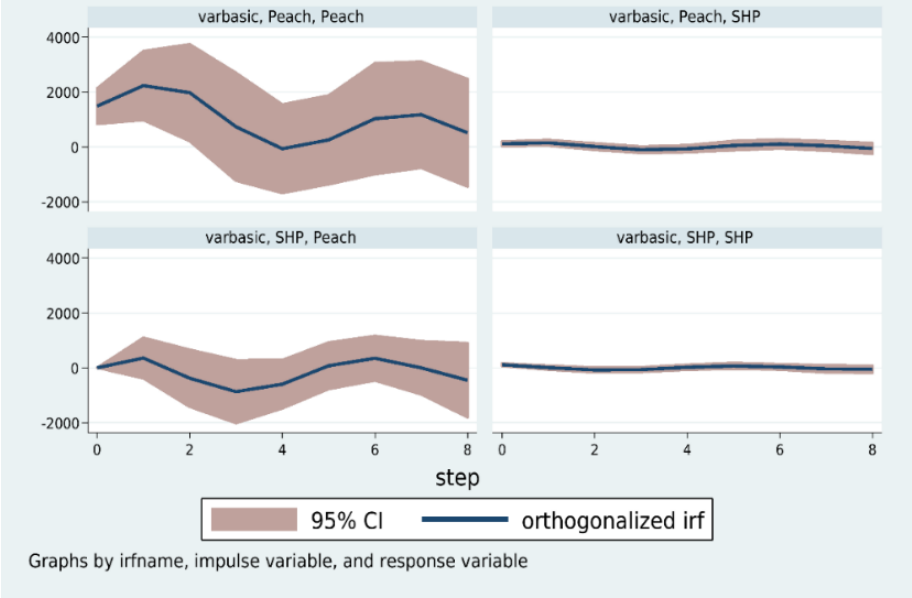


Figure 13: Impulse response function for the effect of secondary market house price on peaches

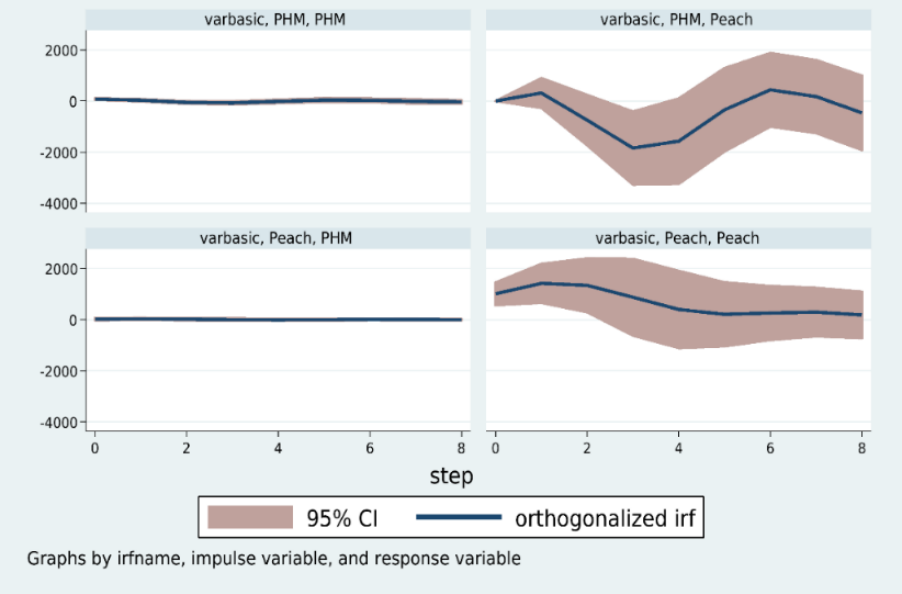


Figure 14: Impulse response function for the effect of primary market house price on peaches

Figure 13 depicts the effect of a shock to the house price in the secondary market on the peaches. We can see that the short-run effect is positive, while in the medium-run, the effect becomes declining until $t = 4$ and gradually increases until $t = 6$ after which the economy moves into the long run, which is the time when the effect of shock on peaches becomes negative again.

Figure 14 reflects almost a similar graph for the effect of one standard deviation shock on the peaches. The effect is positive in the short-run, initially negative and later on positive in the medium-run, and negative in the long-run.

Coming to the one standard deviation increase in the interest rate on deposits, the effect on peaches is negative in the short-run, which persists throughout the medium-run as well. As we move into the long-run, the effect becomes upward-sloping and positive.

Figure 15: Impulse response function for the effect of deposit interest rate on peaches

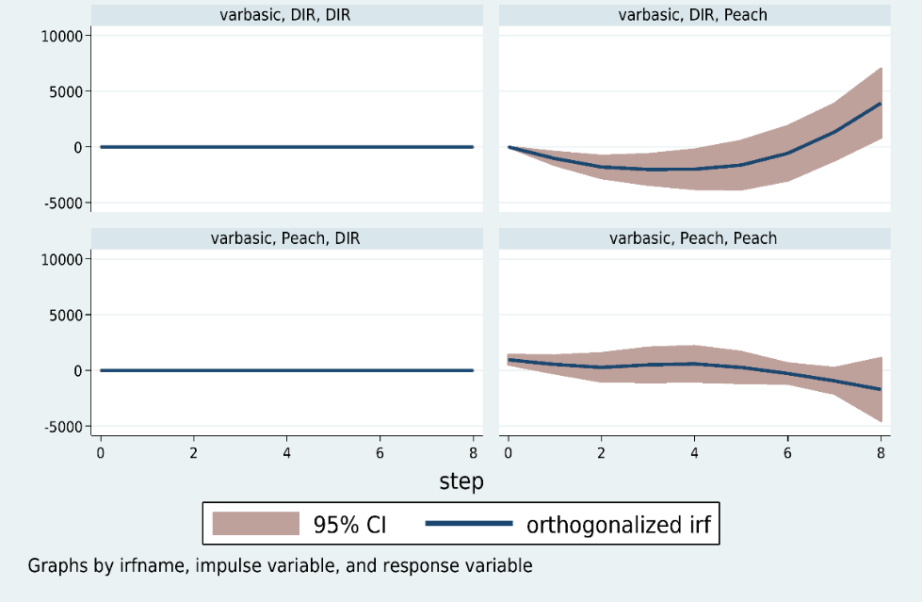
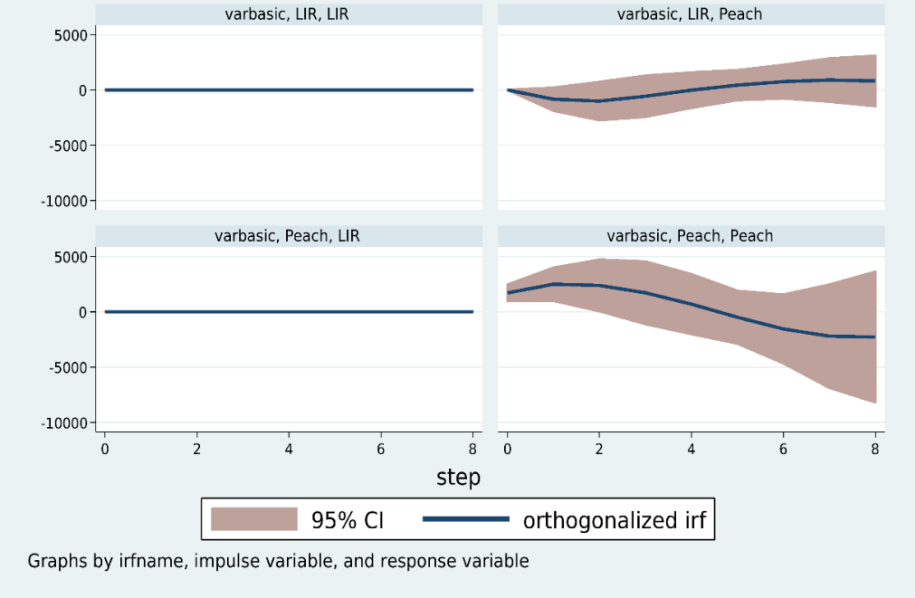


Figure 16: Impulse response function for the effect of lending interest rate on peaches



Finally, we interpret the effect of one standard deviation increase in the lending interest rate on peaches. The initial effect, which happens in the short-run is negative, and it continues all the way to the medium-run, after which the effect becomes gradually positive and increasing, thus becoming positive in the long-run.

Figure 17: Impulse response function for the effect of real interest rate on peaches and lemons

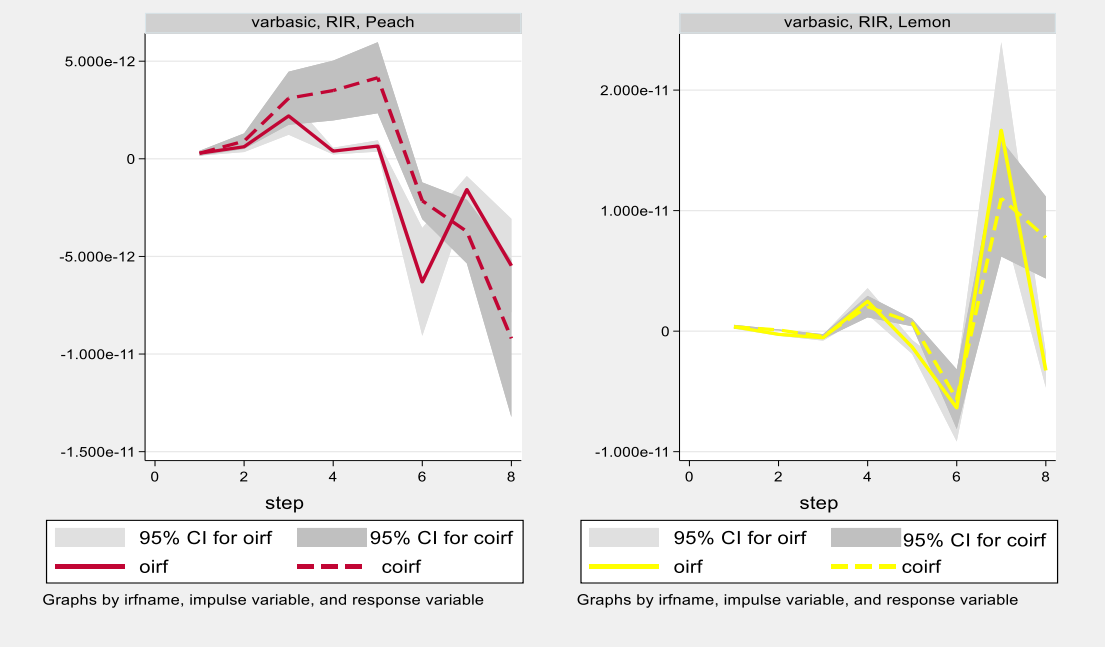


Table 4: Final effects of transmission mechanism channels of monetary policy

	Model 1				***Model 2***			
	Lemons (Overdue Loans)				**Peaches**			
	VEC	**VAR**			**VEC**	**VAR**		
	LR	**SR**	**MR**	**LR**	**LR**	**SR**	**MR**	**LR**
X1	-	+	-	+	-	-	-	+
X2	-	~	~	-	-	~	+/-	+
log_REER	-	~	+	+	+	~	+	-
SHP	+	+	+/-	+	-	+	-/+	-
PHM	+	+	+/~	+	-	+	-/+	-
RIR	+	~	+/-	+/-	-	~/+	-	-
DIR	-	-	-	+	+	-	-	+
LIR	+	~	~	~	-	-	-/+	+
IE	-	-	-/+	-	+	~	~	-

Note 1: ~ denotes that the effect of one standard deviation shock on lemons or peaches was zero
Note 2: +/- or -/+ denotes that the effect of one standard deviation shock on lemons or peaches in the medium-run was first positive and then negative or first negative and then positive, respectively

Figure 17 represents one standard deviation shock in RIR on peaches. The effect is very close to zero in short-run and later on increases slightly to around 2%, while it stepwise declines to negative values in the medium-run and reaches -5% in the long-run. It suggests that the effect of shock in RIR has no effect in the short-run while it has a significant influence on peaches both in the medium and long-run.

When it comes to the effect of the traditional interest rate mechanism channel on the lemons, the effect of one standard deviation shock in RIR is reflected on the right-side of Figure 17. The time path of IRF suggests that the effect of a shock is 0% initially, and as we move into the medium-run, the effect increases to some positive value before it hits the negative area of the graph. Once we reach the long-run, the effect of a shock recovers from negative to positive and reaches its highest point and, later on, declines to the negative value.

Table 4 depicts the combined results of the VEC and VAR models. Given that we take the sign of the one standard deviation shocks in independent variables from the cointegration equation for the VEC model, we can only reflect the long-run trend. In the case of the VAR model, the signs are obtained from IRFs where we can see short-run, medium-run, and long-run effects of those shocks. Results are provided for both - lemons and peaches.

6. ROBUSTNESS TESTS

In order to ensure the reliability and consistency of the empirical results for the lemons in the credit market of Azerbaijan, we used the ratio of non-profit loans to total gross loans as a proxy for the lemons. The sign of the coefficients and their significance for the VEC and VAR model are mainly consistent across Model 1 and Model 2, where the dependent variables are overdue loans and NPTGL, respectively. Additionally, we used house prices in the primary market as a potential proxy for the household liquidity effect transmission mechanism channel to see whether the estimation results are robust or they are subject to change. We found out that the results are robust and exactly the same for Model 1, where we used overdue loans as a dependent variable for lemons. The sign of coefficients, however, changed dramatically along with their statistical significance for Model 2, where we utilized NPTGL as a dependent variable, which suggests that the results reflected by this model is not reliable and should be ignored while providing policy recommendations based on the empirical results of this study. In the case of Model 3, DIR lost its statistical significance even though the coefficient is still has a positive sign. Instead, X2 gained a statistical significance while keeping the coefficient of its sign unchanged. Another change that happened to Model 3 is that the sign of X1 changed, but its effect on lemons and peaches is not in the interest of our study.

7. CONCLUSION AND POLICY RECOMMENDATIONS

The main objective of this study was to analyze the effects of different monetary policy transmission mechanism channels on the credit market of Azerbaijan, which is classified into the lemons and peaches where the former one signifies bad quality loans, while the latter one denotes the good quality loan whose holder can pay the interest rate attached to the loan on time. The paper calls into the question of how the lemons problem in the credit market of Azerbaijan can be mitigated through the monetary policy transmission mechanism channels and how each channel contribute to the time path of both lemons and peaches in the given market. Based on the empirical outcomes obtained by utilizing VAR and VECM models, we defined the long-run and short-run effects of asset, deposit, lending, exchange rate, household's liquidity effect, wealth effect, bank lending channels, cash flow channel, and interest rate transmission mechanism channels on the lemons and peaches in the credit market of Azerbaijan.

The staple empirical results suggest that the logarithmic transformation of the real effective exchange rate denoted by log_REER and interest rates on deposits declines the lemons in the credit market of Azerbaijan in the long-run, which is what we can infer from the negative signs of their corresponding coefficients from the Johansen cointegration tests of VEC model. These results basically suggest that the exchange rate transmission mechanism channel and bank lending channel are effective in terms of deteriorating the number of lemons in the long-run. Thus, the first policy recommendation obtained from this result is that the Central Bank of Azerbaijan should expand the impact of monetary policy through exchange rate and bank lending transmission mechanism channels as effective panaceas of coping with the asymmetric

information problem. Another reason why we highly recommend those aforementioned transmission mechanism channels is that they positively affect the peaches in the long-run in the credit market. We can see the negative sign in front of the coefficient of inflationary expectations for lemons, while this sign is positive once we exert the ratio of non-profit loans to total gross loans as a proxy for lemons. It means that if we consider the liquidity of banks, unexpected price level channel will expand lemons in the loans market. However, one should bear in mind that the results of the second model where we used NPTGL as a dependent variable are not robust, so we ignore its implications. The effect of monetary policy on peaches through unexpected price level transmission mechanism channel, however, is positive in the long-run. Coming to the traditional interest rate channel and balance sheet channel, it is observed that they have a positive effect on lemons in the long-run and correspondingly deteriorates peaches in the same time horizon. Thus, we define that those channels are not desirable for the Central Bank of Azerbaijan to utilize monetary policy as they increase lemons in the loan market.

Finally, we also controlled for the effect of the household liquidity transmission mechanism channel of monetary policy for which we proxied house price in the secondary market. Based on the sign of the associated coefficient of house price in the secondary market, we can infer that the effect of monetary policy on lemons through the aforementioned channel is positive, while it is negative for peaches. On this basis, the Central Bank of Azerbaijan is recommended not to rely on the household liquidity effect transmission mechanism channel to manipulate the economy as it motivates the asymmetric information problem. This result has been verified in the robustness test as well, where we proxied house price in the primary market as a measure of household liquidity effect transmission mechanism channel. Results of the VAR model is reflected through impulse response functions denoted as IRFs. The results of IRFs suggest that for lemons, one standard deviation shock in inflationary expectations will have a negative effect on the time-path of lemons, while we can see that the effect of one standard deviation shock in log_REER will have an incrementally positive effect on lemons in the long-run. The same positive effect on lemons is observed, both for short and long-term, once we considered one standard deviation shock to house price in primary and secondary markets even though the effect was declining in the medium-term. We also observed that the effect of a one standard deviation positive shock to DIR is negative in the short and medium run, while it increases incrementally above zero in the long run for lemons.

Coming to the peaches, we see a negative effect of inflationary expectations, house price in the primary market, and house price in the secondary market is negative in the long-run. However, the effect of one standard deviation shock to the LIR and DIR on peaches is positive in the long-run, whereas the effect is declining in the short and medium-run. The effect of RIR on lemons suggests that the effect is zero in the short-run, while it is initially positive and later on negative in the medium-run. In the long-run, the effect recovers from negative to positive value yet declines to negative value again, which makes the final effect of one standard deviation shock in RIR on lemons in the long-run negative. In the case of peaches, the effect is positive both in the short-run and first half of the medium-run. Starting from the secon-half of the medium-run until the starting point of long-run, the effect is negative. In the long-run, namely from t=6 to t=7, the effect will be increasing temporarily, and after $t = 8$, the effect will decline all the way to negative values, which suggests that the final effect of one standard deviation shock to RIR on peaches is also negative. One has to bear in mind that we interpret the results of IRFs based on orthogonalized irf, not cumulative orthogonolized irf.

7.1. Limitations of study

The main limitation of our study was the lack of a sufficient amount of studies having been devoted to the analysis of Akerlof's Lemons problem, especially for Azerbaijan. On this basis, we could not compare the model specification offered by this particular study to the ones in the review of previous literature. Another noteworthy limitation was the unavailability of data for the proxy values of monetary policy transmission mechanism channels which forced us to restrict the sample size between 2006-2017. The abundance of long-term data, as well as the data on monetary policy effectiveness and uncertainty, would enrich the empirical results by allowing us to delineate the big picture of what is going on in the current term and what is expected for the future.

7.2. Contributions of study

One of the main preeminent contributions of this particular study is the applications of VAR and VEC models to study the effect of monetary policy transmission mechanism channels on the lemons problem in the credit market, which has not been deeply addressed in the review of previous literature for monetary policy and functioning of the central bank. Our results are robust and highly statistically significant for the estimation results of long-run cointegration model derived from VEC. The results of our study bestwo bunch of policy recommendations based on utilization of complex empirical analysis devoted to the particular country. We offer ways of turning lemons into lemonade by finding out which transmission channels are effective in terms of dealing with the aforementioned issue.

7.3. Policy recommendations

The main suggestion for the potential future researches to be conducted to analyze the lemons problem in the loans market through the effect of monetary policy would be to differentiate between the cases when transmission mechanism channels are complements and when they are substitutes of one another, in conjunction with defining how their effects on lemons problem in credit market manifest itself in emerging and advanced economies. That would be an extremely promising and policy analysis-oriented contribution as it has never been addressed so far in the relevant literature. The results of such an empirical work would guide the central banks of both emerging and developed in terms of figuring out which transmission channels should be used as substitutes of each other and which ones must be conducted as complements to attain the most efficient, optimal, and sustainable results in order to burgeon peaches and deteriorate lemons in the loans market. That will inevitably enable the central banks to cope with the asymmetric information problem to prevent any possible moral hazard issue. The next suggestion for future research stems from the role of signallings and forward guidance pertaining to the mammoth central banks such as Federal Reserves, Bank of England, Bank of Japan, and the others whose decision-making changes the direction of the flow in the world economy as a whole. It would be highly recommended to build a signalling game to account for the effects of signals disseminated by different central banks on the lemons problem of their credit market to see how effective this forward guidance strategy of the central banks can be to streamline the ramifications of asymmetric information problem. Future researchers can also analyze how those effects altered during and after COVID-19. Given the absence of a stock market in Azerbaijan, we could not consider the effect of monetary policy on lemons and peaches through Tobin's q theory and wealth effect transmission mechanism channels. If one aspires to conduct similar research for the other country or economies, that would be engrossing to study how monetary policy through the stock market affects the lemons problem in the credit market of a specific economy.

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APPENDIXES

Table A1: Correlation Matrix

	X1	X2	log_REER	SHP	PHP	DIR	LIR	RIR	IE	Lemons	Peaches
X1	1.0000										
X2	0.8355	1.0000									
log_REER	-0.184	0.1032	1.0000								
SHP	0.1955	0.2312	0.7611	1.0000							
PHP	0.3017	0.1999	0.5255	0.9073	1.0000						
DIR	-0.804	-0.7540	0.4561	0.1414	0.0023	1.0000					
LIR	-0.627	-0.5617	0.5632	0.2485	0.0742	0.9349	1.0000				
RIR	0.3026	0.1727	0.3830	0.3514	0.4084	0.0493	0.1179	1.0000			
IE	0.6936	0.5059	-0.7110	-0.416	-0.275	-0.712	-0.645	-0.055	1.000		
Lemons	0.9110	0.7703	-0.3816	-0.058	0.0551	-0.894	-0.755	0.0792	0.701	1.0000	
Peaches	0.9120	0.8924	0.1982	0.5164	0.5362	-0.663	-0.453	0.3712	0.398	0.7771	1.0000

Table A2: Results of Dicky-Fuller Test for Unit Root

Variable name	Dicky-Fuller Test Statistics	1% critical value	5% critical value	10% critical value	Integration Order
Lemon	0.314	-3.750	-3.000	-2.630	I(2)
Peach	-1.751	-3.750	-3.000	-2.630	I(3)
NPTGL	-2.330	-3.750	-3.000	-2.630	I(2)
X1	-1.330	-3.750	-3.000	-2.630	I(3)
X2	-1.357	-3.750	-3.000	-2.630	I(4)
REER	-0.603	-3.750	-3.000	-2.630	I(2)
SHP	-1.817	-3.750	-3.000	-2.630	I(3)
DIR	-0.199	-3.750	-3.000	-2.630	I(2)
LIR	-0.534	-3.750	-3.000	-2.630	I(2)
RIR	-3.398	-3.750	-3.000	-2.630	I(1)
IE	-1.848	-3.750	-3.000	-2.630	I(1)

Table A3: Johansen tests for cointegration

Trend: constant Number of obs = 10
Sample: 2008-2017 Lags = 2

Maximum rank	Parameters	LL	Eigenvalue	Trace statistics	5% critical value
0	12	-147.25378	.	104.8884	29.68
1	17	-116.10429	0.99803	42.5895	15.41
2	20	-95.778973	0.98284	1.9388*	3.76
3	21	-94.809559	0.17625		

Dependent variables: Lemon NPTGL Peach

Table A4: Estimation results of cointegrating equations for the long-run model

Model 1	**Lemons (Overdue Loans)**		***Model 2*** **Lemons (NPTGL)**		***Model 3*** **Peaches**	
Variables	***Coefficient***	***P-value***	***Coefficient***	***P-value***	***Coefficient***	***P-value***
Log_dependent variable	1	.	1	.	1	.
X1	-45.99***	0.000	0.08	0.491	312.55*	0.064
X2	-98.88***	0.000	-1.008*	0.063	-1088.69	0.163
log_REER	-1689.70***	0.000	40.49**	0.013	52032.71**	0.027
PHM	0.38***	0.000	-0.002	0.378	-18.45***	0.000
DIR	-223.67***	0.000	-0.24	0.781	12275.69***	0.000
LIR	205.39***	0.000	-0.30	0.659	-12101.12***	0.000
RIR	3.53***	0.000	-0.02	0.238	-82.88***	0.005
IE	-27.38***	0.000	0.76*	0.050	641.81	0.247
constant	2323.44	.	-77.11	.	-10377.66	.
Parms	8		8		8	
chi2	25135.97		9.320672		431.5697	
P>chi2	0.0000		0.3160		0.0000	

Note: **, **, and *** stan for p<0.10, p<0.05, and p<0.01 respectively*