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Research Article

UNEMPLOYMENT AND TAXES IN IRAN: AN EMPIRICAL STUDY OF THE EFFECTS OF CORPORATE AND LABOR INCOME TAX ON UNEMPLOYMENT

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ABSTRACT
This paper empirically explores the effects of corporate and labor income taxes on unemployment, Using Time-Series data for 1991-2011. Corporate taxation is an important source of government revenue around the world and a major consideration in planning business activities. Another type of taxes that gained particular attention is labor taxes. Increase in labor taxes is one of the prime factors responsible for the increase in unemployment. The hypothesis is tested using Vector Auto-regression (VAR) and Vector Error Correction Model (VECM). The results showed the positive and significant effect of corporate and labor income tax variable on unemployment rate.

Keywords: *Corporate Income Tax, Unemployment Rate, Labor Income Tax, VDCs, IRFs*

INTRODUCTION
Tax is one of the most important tools of financing of government and one of the major variables that by changing its rates, the government can improve macro-economic variables including economic growth, inflation, unemployment, budget deficit and many other issues, and it has major effect on resources allocation and income distribution. It can be said that high tax rates doesn't mean the government can take benefit of tax revenues more, as high tax rates reduce tax revenues of government by reducing business motivation. Efficient uses of these tools leads to providing public revenues of country, expansion justice, re-allocation of resources and economic stability (Pajooyan, 2012).

Research on corporate taxation and research on unemployment are two very distinct fields. On the one hand, several studies have tried to explain the high and persistent levels of unemployment on the basis of distortive institutions (Nickel *et al.*, 2005). On the other hand, there has emerged a large literature on corporate taxation, focusing on distortions in investment, location and international profit shifting (Sorensen, 2006).

There is only little research, however, on the labor market implications of corporate taxation, and virtually no papers on corporate taxes and unemployment in Iran. Yet, corporate taxes may well contribute to involuntary unemployment through it's impact on labor demand. This paper aims to fill this gap in the literature by analyzing the impact of corporate taxation on unemployment.

Persistent unemployment at high levels is a central policy problem in many Countries. Among the alternative policy proposals to reduce unemployment, tax policy shifts have received much interest. During the last decade, in Europe, the effects of taxation on unemployment have been a major research topic in public finance.

On one hand, based on the importance of employment and unemployment as key and strategic factor in increasing economic development, and on the other hand high share of corporate income tax of total tax revenues and the effect of this type of tax on macro-economic variables including unemployment, the present study is evaluated the relationship between corporate and labor income tax and unemployment rate in Iran during 1971 to 2011.

The rest of this paper is organized as follows:

Section 2 discusses the main properties of the corporation and labor income tax and effect on unemployment. Section 3 is devoted to a review of the theoretical and empirical literature. Section 4 describes the data sources and presents the theoretical framework and empirical investigation in Section 5 is based. Finally, Section 6 concludes and offer suggestions in section 7.

Taxes and Unemployment:

Impact of CIT on Unemployment

The corporate taxes increases the cost of capital (the required rate of return on an investment), which raises marginal production costs and exerts a negative effect on capital and labor demand (James and Hines, 2001; Devereux *et al.*, 2002).

Any increase in the cost of capital, can affect the labor market by reducing output, by inducing factor substitution, and by reducing labor productivity. The higher cost of capital induces substitution from capital to labor in production. This renders the negative impact on capital larger, but partly offsets the negative effect on employment. The strength of their latter effect depends on the substitution elasticity between capital and labor. In particular, if the substitution elasticity would be equal to one, employment would remain unchanged. With smaller substitution, employment falls (Bettendorf *et al.*, 2009).

The higher cost of capital due to a corporate tax will increase production costs and lead to a fall in output, thereby decreasing the demand for both capital and labor. However, the increase in the relative price of capital with respect to labor will favor the relative demand for labor, partly offsetting the former effect. Finally, lower levels of capital will reduce the productivity of workers leading to a fall in the wage rate (Lora and Fajardo, 2012).

To the extent that increase in the cost of capital contributes to high structural unemployment rates, some countries may find it attractive to pursue policies that reduce taxes. Also countries have been reducing their corporate tax rate along with a broadening of their tax bases. By raising the cost of capital, tax competition may have contributed to the high structural unemployment problems in these countries (Boehringer *et al.*, 2004).

Incidence of the Corporate Income Tax (CIT)

The requirement that corporations pay taxes does not mean that owners of corporations necessarily bear the burden of the corporate tax, since this burden might be partially or entirely shifted to consumers in the form of higher prices, or to workers in the form of lower wages (James and Hines, 2001).

Harberger (2006) revisited the incidence of the corporate tax in an open economy framework and found that the burden of the tax more than fully shifts to labor. He estimated that the burden on labor might be 130 percent of corporate revenue (Caroll, 2009).

Taxation influences decisions of employers and the return of labor for the employees about labor force participation and labor supply. Similarly, higher burden of taxation on labor, affects the wage offered by employers. Also it may induce workers to work more in order to compensate for the loss of consumption possibilities. Alternatively, they may decide to work less as leisure has become more attractive due to the higher tax rate. Increasing corporate tax will raise the cost of employing someone and will therefore reduce employment. Under competitive markets, wages will fall by the amount of the tax increase provided that labor is in elastically supplied (Haan *et al.*, 2003; Zayanderoodi, 2010).

CIT in a Closed Economy

In assumption a closed economy, which restricts the supply of capital to the economy? If capital is perfectly mobile between countries, but labor is not, a higher tax on corporate income tax in a home country tends to reduce the world rate of return to capital, and tends to shift capital from the home country to the rest of the world. This shift in capital reduces the return to labor in the home country and increases the return to labor abroad. This outflow of capital reduces the return to labor and the home country labor force effectively bears the entire burden of the tax (Moore *et al.*, 2010; Gravelle and Smetters, 2001; Randolph, 2006; Arulampalam *et al.*, 2010).

Impact of Labor Income Tax on Unemployment

The dominant view nowadays is that the increase in unemployment is driven by institutional changes and their interaction with macroeconomic shocks (Nickell *et al.*, 2005; Blanchard and Wolfers, 2000; Blanchard, 2006). One institutional factor that gained particular attention is labor taxes. Increase in labor taxes is one of the prime factors responsible for the increase in unemployment. Not surprisingly, the alleviation of the high tax burden on labor has been declared to be one of the prime instruments to fight high unemployment (Berger and Everaert, 2007).

Taxation affects the labor market through its impact on both labor demand and supply. On the demand side, the employment incidence of an increase in labor taxes depends on the proportion of the tax burden that is borne by the employer. This shifting forward onto the employer's labor costs reflects the degree to which employees can successfully oppose a reduction in their consumption wage induced by a tax increase (Layard *et al.*, 2005).

In addition to the employment incidence of labor taxes, unemployment is also affected by the impact of labor taxes on the supply of labor. Higher taxes may (i) reduce labor supply as the opportunity costs of leisure decline (substitution effect) and (ii) increase labor supply as the disposable income of households declines (income effect). Theory is generally inconclusive in determining which effect dominates (Berger and Everaert, 2007).

A crucial step in Daveri and Tabellini argument is that the effect of higher labor taxes on unemployment is due to higher real wages. This prediction is also strongly supported by the data. They show that higher tax rates on labor are indeed shifted onto higher gross wages in Europe, but not in the other OECD countries. Finally, they show that, as expected, the capital-labor ratio is strongly and robustly correlated with the increase in real wages.

Labor costs have gone up for many reasons, but one is particularly easy to identify: higher taxes on labor. Labor taxes have gone up in almost every country and in almost every decade. If labor markets are competitive, the small elasticity of individual labor supply implies that the burden of a tax on labor income is borne almost entirely by the worker, with little effect on unemployment and the capital-labor ratio. But if workers are organized in monopolistic unions, they can succeed in shifting the burden of labor taxes onto firms. In this case, a rise in labor taxes permanently increases unemployment, and it (permanently or temporarily) increases the capital-labor ratio, reduces the rate of return on capital and slows down economic growth (Daveri and Tabellini, 2000).

Reducing taxes on labor could be a useful tool to stimulate employment. The reasoning is that by reducing taxation of this factor, returns to labor income would become more attractive and hence encourage the take-up of jobs, particularly at the lower end of the wage distribution (and depending on labor supply elasticities) (Planas *et al.*, 2007)

Literature Review

Empirical research on these theoretical predictions is still very limited. Gordon (1986) explores corporate taxation in a model where capital is mobile internationally while labor is not. The open economy is small and takes the world interest rate as given. The corporate tax raises the cost of capital, which reduces capital demand. Given the exogenous after-tax rate of return to capital, workers suffer from this because less capital reduces the marginal product of labor and, therefore, the before-tax wage. Consequently, the incidence of the corporate income tax falls on labor. As the labor market clears, the corporate tax only distorts labor supply. Carroll *et al.*, (2000) analyze the effect of the 1986 tax reform in the U.S on the labor demand. They find that a reduction of 10 percent in the personal income tax rate increases the probability that a firm (or the proprietor) hires someone by 12.1 percent and reduces the rate of growth of the wage bill. Daveri and Tabellini (2000) find that labor taxes partly explain high unemployment rates, whereas consumption taxes exert no significant effect. Corporate taxes are not included in their regressions. Focused on the European Union, Bettendorf *et al.*, (2009) analyze the impact of corporate taxation on employment and unemployment in the context of an imperfect labor market model. The analysis is performed with an applied general equilibrium model that adopts a union bargaining framework to explain equilibrium unemployment on the basis of several institutional variables. They find that raising the corporate income tax revenue by 0.5 percent leads to a 0.2 percentage point increase in unemployment and a 0.2 percent reduction in labor supply (on average for the 17 EU countries). There is scant evidence on the impact of corporate taxes on labor demand in developing countries. Chile has been the subject of some of the few studies.

Martinez *et al.*, (2001) assess the employment effect of corporate taxes through potential complementarities. They conclude that the labor to cost of capital elasticity is near 0.2, implying that, by increasing the cost of capital a higher corporate tax rate should depress labor demand.

According to Torabi (2000) "the effect of monetary and financial policy on employment by Simultaneous models", two equations were used. First equation was total demand equation and national income variable was dependent variable. Government expenditure, export, import and real money supply were independent variables. The second equation was employment and in this equation, employment was dependent variable and wage, price, labor force productivity and national income were independent variables. Tsp7 software and weighted method were used. The results showed that three variables of money supply, taxes and governmental expenditures were effective on employment and the governments should be careful in selecting their policies.

Following Mohammadi (2001) "the effects of tax bases and government expenditures on labor market in Iran during 1971- 1988 based on scientific-economic resources, a Simultaneous model was used by Eviews and 2SLS method. She found that current and civil expenditures of the government variables of government and income tax of firms were effective on employment and the governments should be careful in selecting its policy.

Empirical Model and Data Description

According to theoretical arguments and considering the proposed empirical studies about corporation income tax and unemployment, such as; Bettendorf *et al.*, (2009), Moore *et al.*, (2010) and Carroll (2009) Hann *et al.*, (2003), an experimental model for the study is presented as follows:

$LUN=\alpha_0+ \alpha_1 LCIT+\alpha_2 LT+ \alpha_3 LRW+ \alpha_4 LLP+ \alpha_5 LGGDP+ \alpha_6 LOPEN$

Whereas:

UN: Unemployment Rate, **CIT:** Corporate Income Tax, **T:** Labor Income Tax, **RW:** Real Minimum Wage, **LP:** Labor Productivity, **GGDP:** Size of Government (with index summation of current and civil expenditures of the government on real GDP), **OPEN:** Degree of Openness (with index oil free export on real GDP),

This study employs data that consist of annual observations during the period 1991-2011, to test the corporate income tax and unemployment rate in Iran. In this study, all variables are logarithmic, real and the basic year was 2005. The data has been obtained from time series data published by the Central Bank of the Islamic Republic of Iran.

The variables in the models are deflated by consumer price index (2005), in order to obtain their real values. Hence, these variables enter the behavioral equations in real form.

MATERIALS AND METHODS

Methodology

The Vector Auto Regression (VAR) framework pioneered by Sims (1980) has been the workhorse for this analysis. Although VARs were traditionally used for forecasting, Sims work initiated their use for policy analysis. This approach is adopted as against other possible candidates for several reasons. One, no a priori assumption of exogeneity of variables is required. Two, vector auto regressive model allows each variable in the system not only to impact on itself but also on each other without the need to impose a theoretical structure on the estimates. Moreover, the approach affords us the opportunity of knowing not only how a given variable impact on itself but also on others through the use of variance decomposition (VDCs) and impulse response functions.

The vector auto regression model is one of the most successful, flexible and easy to use models for the analysis of multivariate time series (Gujarati, 2011).

Empirical Results

Unit Roots

In time series analyses, before anything we should investigate the stationary time series. If the time series is not stationary, the regression is spurious. Unit root tests are the most important tests to estimate a regression with reliability coefficient.

(Table 1) presents the estimate of the ADF test in levels with an intercept. The tests have been performed on the basis of 5 percent significance level, using the Mackinnon critical values. Initially, ADF test with an intercept implies that the logarithmic forms of the variables under study are not stationary at levels at 5

percent level of significance. Furthermore, the null hypothesis is rejected at levels test. Forth column of table 1 display the estimate of the ADF test at first differences of the data with an intercept. Test results imply that all variables are stationary at 1^{st} differences. So robust results (ADF test) indicate that all variables are integrated of order one (I(1)). It is a reason to use the VAR model.

Table 1: Unit root test

	Level		**1^{st} difference**	
Variable	**ADF**	**Critical Value**	**ADF**	**Critical Value**
LUN	-2.7930	-2.9389	-6.0401	-2.9389
LCT	-0.2157	-2.9389	-7.9623	-2.9389
LT	-0.2636	-2.9369	-4.9903	-2.9389
LRW	-2.5007	-2.9389	-4.6631	-2.9411
LLP	-2.2144	-2.9434	-4.2753	-2.9434
LGGDP	-1.8173	-2.9369	-3.6861	-2.9458
LOPEN	-0.6512	-2.9411	-4.5282	-2.9389

Source: Computed by Authors

Zivot and Andrews Unit Root Test

Zivot and Andrews (1992) argue that the results of the conventional unit root tests may be reversed by endogenously determining the time of the structural breaks. The null hypothesis in the Zivot and Andrews test is a unit root without any exogenous structural change. The alternative hypothesis is a stationary process that allows for a one-time unknown break in intercept and/or slope. Following Zivot and Andrews, we tested for a unit root against the alternative of trend stationary process with a structural break both in slope and intercept.

(Table 2**)** provides the results. As in the ADF case, the estimation results fail to reject the null hypothesis of a unit root for all variables. So, that the variables had no endogenous structural break. Hence, we maintain the null hypothesis that each variable is integrated of order one or I(1) (Zivot and Andrews, 1992).

Table 2: Zivot and Andrews test for unit roots

Variable	t_{ZA}
LUN	-3.740683
LCIT	-3.66990
LT	-2.441267
LRW	-4.774359
LLP	-4.307797
LGGDP	-3.988204
LOPEN	-2.819697

Source: Computed by Authors

Note: Critical values of Zivot and Andrews at the level 90, 95, 99% were determined by Zivot and Andrews as -4.82,-5.08, -5.57, respectively.

The first step of estimation VAR model is determining the lag length criteria. The Schwartz Criterion (SC) indicated optimal lag length of two.

Since coefficients from vector auto-regressive model are not interpret. Consequently, the dynamic properties of the model are analyzed by examining the variance decompositions (VDCs) and the impulse response functions (IRFs).

Variance Decomposition

This section traces the variance decomposition (VDC) of each variable over a ten period. The results are summarized in (Table 3). The essence of the variance decomposition is to measure the proportion of forecast error variance in one variable explained by innovations in it and the other variables.

First column shows the prediction error of relevant variables during various periods. The reason of the increase is that error is calculated in each year based on the previous year error. Second column of the left side shows the variance decompositions for UN suggest that approximately 90% of the forecast error variance of UN is explained by its own shocks. That in the first period, 100% of unemployment changes are about the unemployment variable and this is reduced over time. In the second year, CIT variable explains 5.59% of unemployment changes and it has the highest explanatory power among other variables. The next columns show other variables that explain the unemployment fluctuations. Of course in long run the share of domestic shocks, in particular CT and labor tax increase.

Table 3: Variance Decomposition of LUN

Period	S.E.	LUN	LCIT	LT	LRW	LLP	LGGDP	LOPEN
1	0.076120	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.097369	85.41936	5.592398	3.539387	2.864312	1.261997	0.184475	1.138069
3	0.117991	78.68021	9.399033	5.449736	2.619766	1.682238	2.169021	4.418235
4	0.126668	69.30316	12.18943	8.224906	2.273386	2.670932	5.338187	5.021086
5	0.128659	65.72105	14.02641	8.881644	2.212164	3.035270	6.123465	5.655843
6	0.129335	62.59692	14.48162	10.48439	2.212068	3.205501	7.019498	5.808808
7	0.130029	58.47894	15.14457	12.89597	2.396082	3.212497	7.871942	5.751906
8	0.131183	55.68979	15.82573	13.24622	2.428896	3.206032	9.603329	5.926460
9	0.131942	58.43234	12.88964	13.65646	2.412511	3.178233	9.430825	6.120707
10	0.132338	55.84876	12.81538	1.40E+15	2.424065	3.173160	9.338642	6.111242

Source: Computed by Authors

Impulse Response Function

This section explores what happens to government revenue and expenditure in the case of a temporary shock. Through the dynamic (lag) structure of the VAR, the impulse response function traces the effect of a once-off shock to one of the innovations on current and future values of the endogenous variables. These impulse response functions are plotted in Appendix 1. It can be seen clearly from Appendix 1 when a shock in CIT and labor income tax occurs, in first three years, unemployment rate increases with an accelerating rate. It maximizes in the fourth period, but after that, these effects approximately remain constant in the long run.

The response of UN to a one SD innovation in RW is positive too. In response to the LP, OPEN, GGDP shocks, unemployment continuously decreases in short run**,** but after 6 periods remain constant in the long run**.** The IRF graphs show that CIT shocks more than any other variable affect UN.

Co Integration

As the variables are stationary at first difference, we therefore tested for Co integration using the Johansen and Juselius (1990) method. Johansen (1988) suggested two tests statistics to determine the co integration rank. The first of these is known as the trace statistics. Co integration analysis helps to identify long-run economic relationship between two or several variables and to avoid the risk of spurious regression. Co-integration analysis is important because if two non-stationary variables are co integrated, a Vector Auto regression (VAR) model in the first difference is miss-specified due to the effect of a common tend. The results of trace and λ-max tests are as reported in (Table 4). The third and the fourth columns at table 4 show the λ-max statistics and critical value at 5 per cent, while the fifth and the sixth column report trace statistics and critical values. The results in table 4 show that the null hypothesis of no Co integration relationship can be rejected at the 5 per cent level using either trace or λ-max statistics. Also that the null hypothesis of one Co integration relationship rejected at the 5 per cent level.

According (Table 4), trace and λ-max tests suggest two co integration vectors. This simply means that a long-run relationship exist among the variables. This result, suggests that these variables could not have moved too far away from each other.

Table 4: Johansen Co-integration Test

Null	Alternative r	λ-max	Critical values	Trace	Critical values
R≤0	1	81.97881	46.23142	208.8854	125.6154
R≤1	2	55.94173	40.07757	126.9066	95.75366
R≤2	3	32.33108	33.87687	70.96491	75.81889
R≤3	4	19.77937	27.58434	38.63383	47.85613
R≤4	5	11.44961	21.13162	18.85447	29.79707
R≤5	6	7.181812	14.26460	7.404852	15.49471
R≤6	7	0.223039	3.841466	0.223039	3.841466

Source: Computed by Authors

The co integration vector which is normalized on dependent variable (LUN) chooses as a long-run equilibrium relation.
The long-run model of corporate income tax and unemployment is as (t-statistics of each variable is shown in) follows:
LUN= 5.154692 + 0.368341 LCIT + 0.144661 LT +
(6.84392) (2.62782)
0.006788 LRW - 0.636954 LLP - 0.683391LGGDP
(0.08350) (3.27407) (6.50072)
- 0.508288 LOPEN
(13.4092)
In the long-run model, the CIT coefficient is positive and significant, which is consistent with the theoretical foundations of the study and the research hypothesis is confirmed.
We find that the effect of labor income taxes on unemployment is positive and significant.
As increasing productivity growth leads to turning capital and then reduction of employment costs of labor force and the increase of labor force demand, productivity rate coefficient of labor force can be negative and significant.
Minimum Wage coefficient is positive and not significant. Since an increase in production costs due to minimum wage increases, employer's demand for labor decline, so unemployment increase. Estimated coefficient trade openness is negative. Increased export will lead to increase aggregate demand; production and thus labor demand, wages and employment also increase. Trade improves labor productivity and reducing unemployment. Increased trade, especially export, increased production and employment will increase (Kim, 2011)
As you can see, the variable size of the government size with index (G / GDP) is negative. According to economic theory, we expect, high government expenditure (including current payments and civil expenditure of the government) resulted in decreasing the unemployment rate. The increase in government investment plans will lead to increase production and reduce unemployment rate.
In addition, regarding current payment, it can be said, majority of current payments is dedicated to employment of labor force in governmental systems and this is with reduction of unemployment rate.

The Estimation of Error Correction Model

Error correction model associates short-term fluctuations of the variables to the balanced long-term values. To determine the error correction model, the error term of co-integration regression with time lag is put as explanatory variable beside the first rank difference of other model variables. The estimation of error correlation model is shown in table 5 the coefficient of error correction term is significant and -0.23. It shows each year, 0.23 of imbalance of one period is adjusted in unemployment rate function of the next period. Thus, adjustment is to the balance during 4 years. The estimation results showed that all the variables except is significant and were obtained based on the expectation.

Table 5: VEC model estimates

Variable	Coefficient	t statistic
Ecm	-0.23	-2.86711

Source: Computed by Authors

Table 6: Correlation LM test

Lags	LM-state	Prob
1	57.00475	0.20
2	52.36069	0.34
3	49.88140	0.43
4	40.08290	0.81
5	44.68595	0.64

Source: Computed by Authors

Table 7: Heteroskedasticity Test

Chi-sq	Prob
804.3817	0.2991

Source: Computed by Authors

Diagnostic Test

The result of diagnostic tests of serial correlation, heteroscedasticity test has been reported in table 6. As can be seen, there isn't correlation error and heteroscedasticity in the model. Therefore, based on the estimated results of the model and conducted diagnostic tests, it seems that the VAR model is an appropriate model to explain the relationship between corporate income tax and unemployment rate, and the confidence of the results can be trusted.

Conclusion

This paper analyses the relationship between corporate and labor income tax and unemployment. We find that, by increasing the cost of capital, corporate taxes raise equilibrium unemployment. The magnitude of this effect declines with the substitution elasticity between labor and capital in production and the responsiveness of wages to unemployment. One institutional factor that gained particular attention is labor taxes. Increase in labor taxes is one of the prime factors responsible for the increase in unemployment. Taxation affects the labor market through its impact on both labor demand and supply. The employment incidence of an increase in labor taxes depends on the proportion of the tax burden that is borne by the employer. Higher taxes may (i) reduce labor supply as the opportunity costs of leisure decline (substitution effect) and (ii) increase labor supply as the disposable income of households declines (income effect). Theory is generally inconclusive in determining which effect dominates.

All the variables of the model are nonstationary at levels. Results (ADF test) indicate that all variables are integrated of order one (I(1)). As a matter of necessity, the study tested for cointegration using the Johansen and Juselius approach which is suitable for VAR model. The result shows that (at 5%) there is at least two cointegrating relation in each of the models. This naturally allowed us to proceed to the estimation of VAR. The results of trace and maximum eigenvalue tests show two cointegration vectors. All variables are significant and according with theory. Coefficient of error correction term is significant and -0.23. It shows each year, 0.23 of imbalance of one period is adjusted in unemployment rate function of the next period.

Suggestions

Totally, based on the results of the present study, to present political recommendations to reduce unemployment rate, the following recommendations are presented:

Taxes on consumption might serve as alternatives for the corporate income tax.

Giving suitable and long-term tax exemptions to manufacturing and export firms for increasing growth in productions and this leads to more labor force employment and reduction of unemployment.

Giving tax credit of employment to encourage the institutions to employ extra worker.
The tax system structure should be designed as not damaging the production and manufacturer and investors won't be at loss. It is better to use other taxes improving consumption model instead of income tax as a threat for production and human resources employment.

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Appendix 1: Impulse Response Functions