Public Assistance and the Labor Market: an Equilibrium Analysis

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18 December 2015

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PRELIMINARY

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January 12, 2016

Abstract

In this paper,we construct an equilibrium search model of the labor market augmented to include lump sum taxes that finance government expenditures. Using the model, we can decompose the decline in labor force participation (LFP) into the policy effect *(state provided income)* and that of other factors such as declining economic output. The model is estimated using census data on labor market outcomes and welfare income in Ohio. We learn that if the economy resembled the pre-crisis period, the decrease in welfare income during the Kasich administration would have led to a small increase in LFP.

1 Introduction

Governor John Kasich spent nearly two decades in Congress before winning election as Ohio Governor for the first time in 2010. He won re-election by an overwhelming 30 points in 2014. By September 2015, the unemployment rate in Ohio was down to 4.5%, according to data compiled by the Federal Reserve, a significant improvement from near 9.0% when John Kasich took office in 2011 and Ohio's joblessness and the national rate were tied. How much of this improvement can be credited to the Governor John Kasich and his administration?

Since 2005 *(before the Great-recession)*, labor force participation has been on a decline both in Ohio and in the rest of the nation. During the same period, in the state of Ohio, the share of General Revenue Fund (GRF) disbursements that went to Public Assistance and Medicaid has increased. The GRF only represents just under half of the money the state spends. It represents those funds which are most flexible, in most cases not designated for a specific purpose, and so the state has more discretion over the allocation of these funds. On one hand, Governor Kasich cut taxes. On the other hand, despite an overall decrease in spending, transfers to households in the form of public assistance which already dominated GRF expenditures, have been on the rise. The 2014 figure represents a 13.82% increase compared to 2007 under the last conservative governor. GRF disbursement tables for 2007, 2011, 2012 and 2014 are included in the appendix.

In this article, we compare labor market outcomes well before and after governor John Kasich. Using an equilibrium search model of the labor market, we estimate the value of labor force participation (LFP) that is consistent with welfare income in Ohio before *(under governor Taft)* and after *governor Kasich*. By holding output constant to pre-recession levels, we can recover the effect of a change in welfare income on labor force participation. Our model allows us to decompose labor force participation into the policy effect and that of other factors such as a declining economic output. Did the value of employment income decrease relative to welfare income due to the economic climate or because of government policy? We then provide a discussion about the labor market effects of welfare spending in the long run.

Existing studies regarding the effect of fiscal policy on labor market outcomes are worth mentioning. Ravn and Simonelli (2007) find that expansionary fiscal policy stimulates employment and lowers unemployment. Bruckner and Pappa (2011) provide evidence that unemployment rates can also increase as a result of a fiscal expansion due to increased labor force participation. To reconcile theory with evidence, they add the participation margin in a New Keynesian model with labor market frictions as in Ravn (2008). In their framework, due to sticky prices, the increase in government spending generates a labor demand effect and so more workers enter the market since in times of high labor demand, their probability of finding a job increases. Their result relies on the following key assumptions: (1) price stickiness in the short run causes real wages to increase when government expenditures causes an increase in aggregate demand which

in turn causes labor demand to increase (2) All workers who are not employed *(insiders and outsiders)* whether participating or not, collect unemployment benefits in their framework which is also key to generating increases in labor force participation.

A long list of literature has highlighted the postive effects of welfare reform on labor force participation. Lubotsky (2004) provides empirical evidence that the 1991 elimination of the General Assistance program in Michigan contributed to a 2-4% increase in LFP among high school dropouts *(low skilled workers)*. For a complete review of this literature, see Bartik (2000).

The main challenge in measuring the effect of a fiscal expansion is caused by the fact that although government expenditures affect economic variables which in turn also affect fiscal policy and the size of government transfers to households. A fiscal expansion is the outcome of a decrease in economic activity that leads to an increase in the claimant count. With these issues in mind, we construct a dynamic equilibrium search model of the labor market augmented to include the labor force participation decision and a government budget. We impose a balanced government budget such that any increase in government spending must be fully funded by lump sum taxes. In our model, we distinguish between job seekers allowance *(unemployment benefits)* which incentivizes labor force participation and welfare transfers to inactive households that reward the "welfare scrounge".

In our model, an increase in the value of welfare transfers leads to a decline in labor force participation (LFP) since less unemployment compensation im-

plies lower job search subsidies. On the positive side, when the labor market becomes less congested, the job finding rate increases and the unemployment rate falls. The problem arises from the fact that since LFP declined, even though workers find jobs at a faster rate, fewer workers are actually in employment. This decrease in the stock of employed workers causes tax revenues to decrease and so the unemployment benefit falls, reducing the job search incentive further. This negative effect on job search incentives is exacerbated by poor economic conditions *i.e. a decline in output*. It is in fact well documented that higher unemployment insurance subsidizes job search thus causing both higher participation incentives despite longer spells of unemployment (see the search theoretic literature on unemployment insurance). On the firm side, jobs are created so long as the surplus is non-negative. This implies that decrease in the surplus leads to a decrease in the number of new vacancies.

State welfare transfers discourage labor force participation of less able workers. A recession exacerbates the negative effects of welfare spending since total government revenues fall during a recession for two reasons: (1) the government is not allowed to borrow in our framework and (2) an increase in taxes causes the surplus to decrease. As a result, fewer vacancies are created, the job finding rate decreases leading to a higher jobless rate at lower levels of welfare income.

Our quantitative analysis reveals that the value of welfare income decreased under governor Kasich and so the observed increase in public assistance spending is due mostly to economic conditions outside of the administration's control.

In the next section, we present stylized facts about the Ohio economy and

the rest of the US states which will be used for our quantitative analysis. In section 3, we introduce our model. In section 4, we present our quantitative analysis and a discussion of the results. Section 5 concludes.

2 Stylized Facts

For our analysis, we use IPUMS USA complete samples for 2007 and 2014. We restrict our analysis to heads of households in the working age population (age 25-54). We choose ages 25-54 because these individuals should be in the labor force however by 2014, only 88% were active market participants in Ohio.

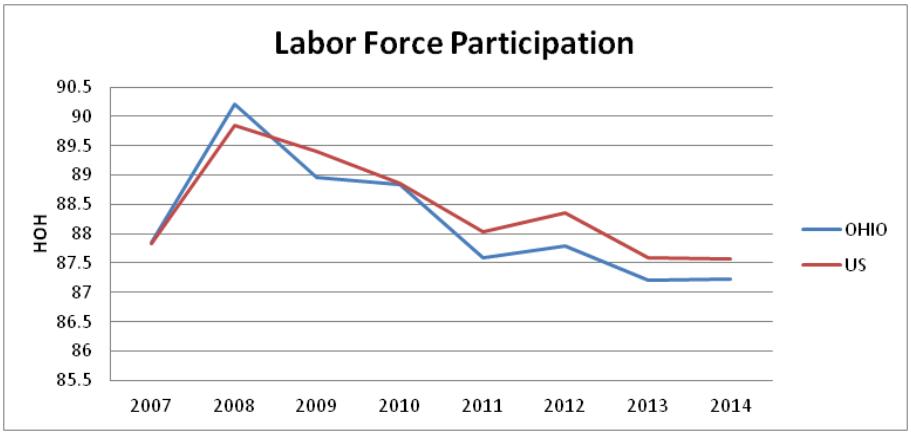

Figure 1: Labor Force Participation

Unemployment rates followed the rest of the nation during the recession. The following figures illustrate the unemployment rate.

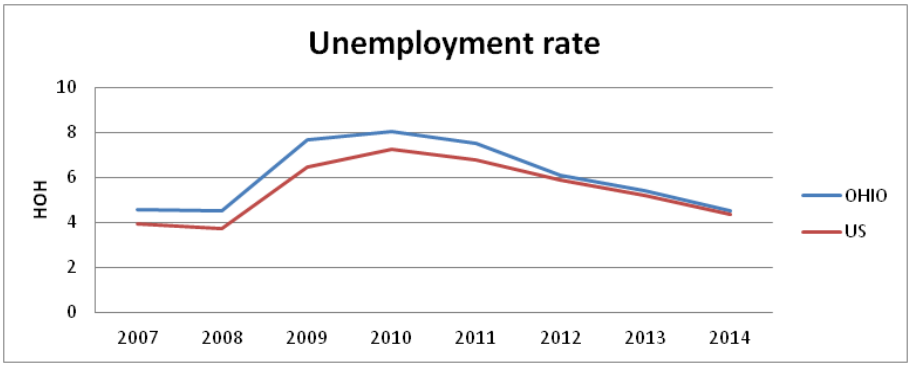

Figure 2: Unemployment

Figure 3 shows the percentage of heads of households receiving state income.

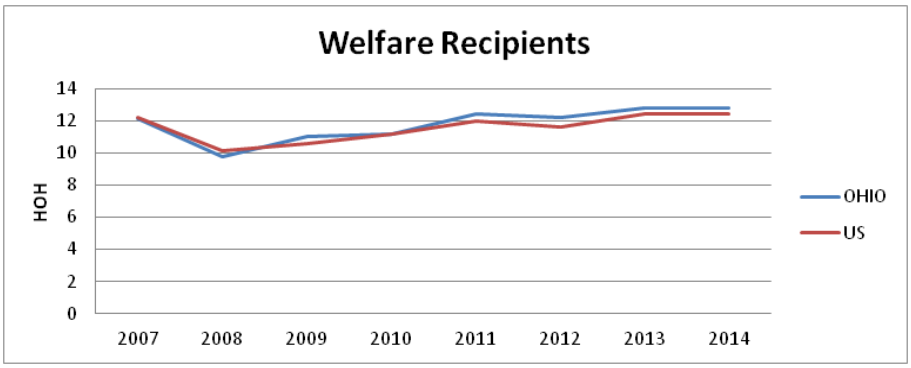

Figure 3: State income recipients

In figure 4, we distinguish between income to unemployed heads of households and income to individuals who are not participating.

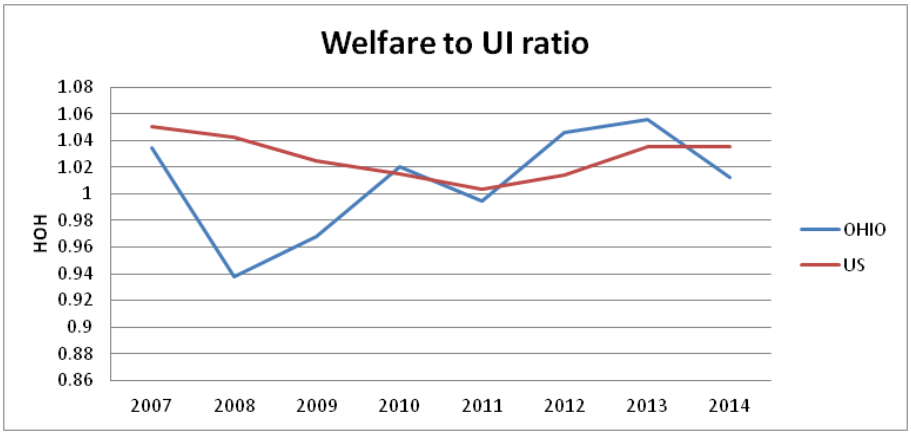

Figure 4: Welfare income to Unemployment income

In table 1, we compare cross-sections under both regimes.

Table 1: Ohio **Labor Market**	**2007**	**2014**
LFP rate	0.8786	0.8723
Unemployment rate	0.0456	0.0454
Real mean hourly wage	20.01	24.40
Job Separation rate	0.037	0.034
Inactive reporting welfare income	0.1214	0.1277
Welfare/UI	1.034	1.013

3 The Model

Time is discrete. The economy is populated with agents of denoted by N^s. All agents live $T \geq 2$ periods and discount the future at rate $\beta = \widetilde{\beta}(1-\Omega)$, where Ω is the rate at which agents exit the economy. Agents can stay out

of the market, they can enter the market and become employed or end up unemployed. The superscript $s \in \{n, e, u\}$denotes the state of workers for not participating, employed or unemployed respectively. The surplus is defined as $S = x - R_w - R_f$, where x is the output produced by a successful match, R_w is the worker's reservation value and R_f is the value of the firm's outside option i.e. the cost of posting a vacancy (assuming free entry). Employed workers earn a wage w. Employed workers are taxed a lump sum tax τ_w. Each period the government collects tax revenues spent on unemployment benefits and other forms of household transfers. There is no government borrowing and so the tax rate balances the government budget constraint each period.

Agents in our economy solve the following problem:

$$V^s = \max E_0 \sum_{t=0}^{T} \beta^t U(C_t) \tag{1}$$

where C_t is the period's consumption.

3.1 The Labor Market

At the matching stage, vacancies and workers who are searching are matched through the following matching process. A vacancy searching meets an applicant with probability $q(\theta)$where $q : \mathbb{R}_+ \to [0, 1]$ is a twice-differentiable, strictly increasing and strictly concave function with boundary conditions $q(0) = 0$ and $q(\infty) = 1$. Similarly, a worker in a given submarket meets a vacancy with probability $\lambda(\theta) = q(\theta)/\theta$, $\lambda(0) = 0$ and $\lambda(\infty) = 1$. We refer to θ as the queue

of applicants, that is the ratio of workers to available vacancies (the inverse of the labor market tightness). We define the "queue" as:

$$\theta \equiv \eta \left(\frac{u}{v} \right) \tag{2}$$

where u denotes unemployed workers, v is the mass of vacancies and η is a matching efficiency parameter.

The probability that a vacancy receives at least one applicant is:

$$q(\theta) = 1 - \exp(-\theta) \tag{3}$$

We now define the probability that a worker finds a job as:

$$\lambda(\theta) = \frac{q(\theta)}{\theta} \tag{4}$$

3.2 Value Functions

3.2.1 Workers

The value of an unemployed worker is:

$$V^u = R_w - \chi + \lambda(\theta) V^e(w) \tag{5}$$

where χ is a search cost and

$$R_w = A + b + \beta V^u \tag{6}$$

In other words, if an unemployed worker is not lucky in the labor market, he obtains the unemployment benefit and gets to search again in the following period.

The value of an employed worker is:

$$V^e(w) = w - \tau_w + \beta[(1-\delta)V^e(w) + \delta R_w] \tag{7}$$

The value of a worker who does not participate in the labor market is:

$$V^n = A + \varsigma\ T_w + \beta(V^u - \gamma) \tag{8}$$

where ς is the claimant rate, T_w is the value of welfare income provided by the state and γ is a cost for delaying market entry (assumption: experience improves market prospects). The transfer can be interpreted as public assistance, disability benefits i.e. the share of government spending that is enjoyed by the inactive share of the working age population.

The probability that an agent enters the labor market is $\Delta \equiv \Pr[\xi \geq \xi^*]$ where the threshold $\xi^* \equiv V^n - V^u$. ξ is assumed to be i.i.d and symmetric about its mean and can represent unobserved idiosyncratic ability or perhaps other unobserved characteristics that make some individuals more likely to participate in the labor market.

The worker's problem at the start of each period is:

$$V = \max_{\{\Delta,\theta\}} \{V^u, V^n\} \tag{9}$$

3.2.2 Firms

The value of a vacant job is:

$$J^V = -k + q(\theta)J^F \tag{10}$$

The value of a filled job us:

$$J^F = x - w + \beta[(1-\delta)J^F] \tag{11}$$

We assume free entry and so vacancies are created until the surplus is exhausted such that:

$$k = q(\theta)J^F \tag{12}$$

3.3 The Government Sector

Given the public assistance to households, the government must choose the tax rate that balances its budget.

Tax revenues each period are paid by the employed population:

$$T = \tau_w N^e \tag{13}$$

where $N^e = \Delta\ \lambda(\theta)\ N$

$$G = N^u b + N^n\ \varsigma\ T_w \tag{14}$$

where $N^u = \Delta\ [1 - \lambda(\theta)]\ N$, $N^n = (1 - \Delta)N$.

Given b and T_w,

$$\tau_w = \frac{T}{N^e} = \frac{G}{N^e} \tag{15}$$

The government budget constraint is binding and so the tax τ_w is chosen such that $T = G$.

3.4 Equilibrium

Given the state of the economy: output per worker, x, the government policy regarding welfare $\frac{T_w}{b}$, the claimant rate, ς, the search costs χ, γ and aggregate risk δ, an equilibrium consists of a choice of: a queue $\{\theta^*\}$, a tax schedule $\{\tau_w^*\}$ such that workers maximize, firms maximize *(the value functions are satisfied)* and the government budget is balanced.

3.5 Algorithm

For any given level T_w and b

- Set an initial guess for the tax $\{\tau_w\}$
- Guess on the population that enters the labor market
- Compute the queue and the implied job finding rates from the matching technology described in the earlier section of the paper
- Using the job finding rate, update the value of workers, firms and compute tax revenues as well as government expenditures.

- Check that the government constraint holds otherwise update the tax
- Using the model outcomes, update the initial population guesses and iterate until convergence. A steady state equilibrium is reached when the job finding rates are constant after each iteration, i.e. the model outcome has converged to the inital guess and so the fraction of workers who participate in the market each period is constant. In addition, the tax is such that the government runs a balanced budget.

4 Quantitative Analysis

For our analysis, we divide parameters into fixed parameters which are observed and directly taken from the data and free parameters which are estimated to match moments from the same data. Our fixed parameters $\frac{T_w}{b}$ from US census income variable, β chosen to match US yearly interest rate, job separations are US annual average from BLS job openings and labor turnover survey. The following parameters: $A = 1, b = 1, \gamma = 0.1$ are classed as normalized since the value (level) of these parameters does not affect the results.

There are four free parameters $\{x,\ \chi,\ \eta,\ \Omega\}$ chosen to match real wage, labor force participation rate, hiring rate and unemployment rate respectively. Tables containing the value of fixed parameters and estimated parameters are included in the appendix.

The following table show the estimated gains from labor force participation in Ohio in 2007 and in 2014.

Table 2: Results

2007	$\frac{T_w}{b} = 1.034$	**2014**	$\frac{T_w}{b} = 1.013$
$(V^u - V^n)$	35.6171	$(V^u - V^n)$	36.5832
V^u	40.6163	V^u	42.3258
V^n	4.9993	V^n	5.7427

Table 3 highlights results from a counterfactual: What would the labor market look like under Governor Kasich if economic conditions resembled the pre-crisis period? Holding parameters fixed at their 2007 levels, we investigate the effect of the change in $\frac{T_w}{b}$ to the 2014 ratio

Table 3: Change in Welfare Income in Ohio

Estimated LFP		The Labor Market	$\frac{T_w}{b} = 1.013$
$(V^u - V^n)$	35.6641	LFP rate	0.8790
V^u	40.6406	Unemployment rate	0.0456
V^n	4.9765	Wage	19.997

Our results indicate that if economic conditions resembled the pre-crisis period, LFP would have been only slightly higher under governor Kasich. The decrease in welfare transfers is small suggesting that more welfare cuts are needed.

4.1 Discussion: Welfare Income

In this section we compare steady state outcomes to investigate the effects of an increase in the value of government transfers to inactive households. As the share of tax revenues that goes to inactive households increases at the expense of

benefits to job seekers, fewer workers enter the labor market. Those who enter are also more likely to find a job since the labor market becomes less congested (see fig. 5).

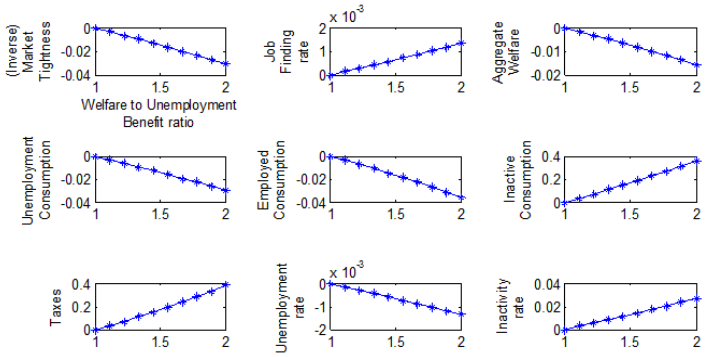

Figure 5: The effect of welfare income

5 Conclusion

In this article, we construct a dynamic equilibrium search model of the labor market augmented to include a government sector. We learn that an increase in the share of government revenues that is spent on welfare programs can cause labor force participation to decrease. Welfare transfers discourage labor force participation of less able workers. Although taxes increase, fewer workers become employed and so tax revenues fall. As a result, the larger inactive population is left equally sharing the decreased total tax revenue. Our results are particularly interesting since policymakers who are concerned with reducing

inequality often advocate for increases in welfare spending.

Using Census data for the state of Ohio, we learn that if economic conditions in 2014 resembled the pre-crisis period, welfare transfers under governor Kasich would have led to a small increase in labor force participation (less than 1%). The model results suggest that more aggressive welfare cuts are needed. The simplicity of our reduced form model provides a great tool for educators and policymakers. The model can easily be extended to answer a substantial number of related policy questions.

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APPENDIX

Model Parameters

Fixed parameters are in table 4 and 5. Estimated Parameters are in table 6 and 7.

Table 4: Ohio_{2007}

Public Assistance Income	$T_w/b = 1.0343$
Claimant rate	$\varsigma = 0.1214$
Job Separations	$\delta = 0.037$

Table 5: Ohio_{2014}

Public Assistance Income	$T_w/b = 1.0127$
Claimant rate	$\varsigma = 0.1277$
Job Separations	$\delta = 0.034$

Table 6: Ohio_{2007}		Data Target
Output per worker	$x = 24.5316$	Wage income
Matching function parameter	$\eta = 0.0425$	Hire rate
Search Cost	$\chi = 1.5878$	LFP rate
Discouraged workers	$\Omega = 0.0093$	Unemployment rate

Table 7: Ohio_{2014}		Data Target
Output per worker	$x = 26.0109$	Wage income
Matching function parameter	$\eta = 0.0406$	Hire rate
Search Cost	$\chi = 2.0628$	LFP rate
Discouraged workers	$\Omega = 0.0057$	Unemployment rate

The General Revenue Fund

In tables 8a, 8b and 8c, we compare changes in the General Revenue Fund (GRF) Expenditures in real terms between 2007 and 2014. Ohio State General Revenue fund disbursements can be obtained from the Ohio Office of Budget and Management *(http://obm.ohio.gov/Budget/monthlyfinancial/default.aspx).* The share of disbursements that go to Public Assistance and Medicaid has increased.

Table 8a : **Disbursements (in thousands) 2007/CPI=582.343 (1967=100)**

Education	4,788,797 (8223.33)
Public Assistance and Medicaid	5,290,167 (9084.28)
Health and Human Services	658,754 (1131.21)
Community and Economic Development	85,227 (146.35)
Tax relief/Property tax reimbursement	617,254 (1059.95)
Other Expenditures	1,579,460 (2712.25)
Total	13,019,659 (22357.37)

Table 8b : **Disbursements (in thousands)**	**2014/CPI=706.977**
Education	4,645,563 (6571.02)
Public Assistance and Medicaid	7,310,019 (10339.83)
Health and Human Services	653,057 (923.73)
Community and Economic Development	-
Tax relief/Property tax reimbursement	893,067 (1263.22)
Other Expenditures	1,880,872 (2660.44)
Total	15,382,578 (21758.23)

In 2007, Public assistance and Medicaid made up 40.6% of all GRF disbursements, up to 47.5 % of GRF disbursements in 2014. Total GRF disbursements decreased by 2.68%, however spending on public assistance and medicaid increased by 13.82%.

Table 8c : **Disbursements (in thousands)**	**2011**	**2012**
Education	4,704,566	4,621,675
Public Assistance and Medicaid	5,860,256	6,765,225
Health and Human Services	592,201	555, 938
Community and Economic Development	55,835	47,411
Tax relief/Property tax reimbursement	841,655	865,060
Other Expenditures	1,602,883	1,350,212
Total	13,657,396	14,205,521

Table 8c reveals that Public assistance made up 42% of the GRF actual disbursements in 2011 and 47.6% of expenditures in 2012.

Table 8d: **Receipts (in thousands)**	**2007**	**2014**
Tax Receipts	8,695,846 (14392.5)	9,968,148 (14099.7)
Non-Tax Receipts	2,971,687 (5102.98)	4,618,300 (6532.46)
Transfers	255,986 (439.58)	52,730 (74.59)

Table 8d reveals that tax receipts decreased by 2.03% in real terms while it is non-tax receipts that in fact have contributed to the increase in the General Revenue Fund receipts. Most of this increase in non-tax receipts was provided by the Federal government in the form of grants and reimbursement to the state for certain GRF expenditures made by the Department of Job and Family Services. In 2007 non-tax receipts made up 25.6% of all receipts while in 2014, these federal grants made up 31.6% of all receipts. Taking inflation into account, we learn from the tables that GRF Expenditures are 2.68% below expenditures during the pre-recession Taft administration. Despite an overall decrease, public assistance and medicaid are 13.82% higher in 2014 under Governor Kasich than under Governor Taft in 2007.