

Simplification of Earned Income Tax Credit with the LG Tax System

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Abstract

The complexity of the current Earned Income Tax Credit (EITC) Table contains nine pages of the overwhelming tax amounts information. If employers would exempt from calculating the EITC for withholding income taxes, the employees will need to calculate and deduct it when they file tax returns. Their EITCs will be validated if the earned incomes are low and meet some certain standards of the tax code. Some states often let a partial of the EITC to be deducted as a state EITC. Kao and Lee (2013) have developed a linear and gradual (LG) tax system to simplify the existing US progressive personal income taxation. The proposed LG system would eliminate the current complex Tax Tables and Tax Rate Schedules by using some simplified tax calculations. The similar process would apply to the EITC Table for simplifying the EITC in the filing report. This simplified and practical method could help employees to reduce the complication of the existing income tax returns. The tax statuses and the number of children will remain in the table for applications. Employees can then calculate the EITC as a tax credit according to their earned income levels, tax statuses, and the number of children with the EITC rate formula. Their employers could then calculate the EITC with more precise and condense way for their employees. It would further benefit for those who have a simple tax status or opt not to file their normal tax returns. The result could benefit in reducing tax processing time and cost for both employees and governments without trailing the tax revenue. The proposed simplification system has been analyzed and presented for Federal and State levels of individual earned income credits.

Key words: Earned income tax credit, tax simplification; federal and state individual income tax; linear and gradual tax system

JEL codes: G18, H21, H25, H71, C02

Introduction and Literature Reviews

The recent tax reform was proposed by the U.S. president Donald J. Trump in September, 2017. With goals of four tax reform principles, they are to focus on achieving more jobs, fairer taxes, and bigger paychecks. The first principle is to focus on making the tax code simple, fair, and easy to understand. Also, the intent of the tax reform is to create a rational system that would extend economic benefits to American workers, small businesses, and middle-income families.

In the new tax framework, it condenses the current seven into three tax brackets with three rates of 12%, 25%, and 35%. The additional top rate for the highest-income taxpayers is to ensure that the wealthy group to do not contribute a lower share of taxes paid than they do today. Furthermore, it would provide simplicity and fairness of the framework to eliminate many itemized deductions that are primarily used by them. It will retain tax incentives for home mortgage interest, charitable contributions, and tax incentives for working people, higher education, and retirement group.

The Earned Income Tax Credit (EITC) is the federal government's largest refundable credit for workers who earn low or moderate incomes. This credit is meant to supplement the income for those who have earned through working either by the self-employed or by employment for someone in business or farm. If a tax payer is qualify for the EITC, the person can reduce tax owes and increase tax refund. As a whole, the EITC would allow more working people and their families to keep more of their hard-earned money and provide more constructive impacts in their life, family, and community (IRS 2018). In the same report, the IRS also described that the EITC is one of the largest antipoverty programs for the US. As a nationwide

statistics, total 27 million eligible workers and families received about \$65 billion during 2017. Four out of five people are eligible to claim it. Both EITC and the Child Tax Credit programs have greatly reduced the poverty for working families. These working family credits assisted an estimate of 9.4 million people out of poverty, including 5 million of children. And, the most significant result showed that the cost of EITC administration in the EITC program ratio to total claims paid is only less than one percent.

The report also suggested that the rest of 20% people who are qualified for the EITC but did not claim it on their tax returns might also be benefited from the advantage. The people in this category includes who are self-employed, living in rural areas, grandparents raising their grandchildren, the recently divorced, the recently unemployed, taxpayers with no children, and recipients of disability benefits.

Beginning of the tax year 2018, the Internal Revenue Service (IRS) has announced the annual inflation adjustments for a number of tax-related provisions for 2018, including, the latest tax rate schedules and tax tables. The EITC for 2018 has made some modifications, the maximum EITC amount available is \$6,444 for taxpayers filing jointly who have 3 or more qualifying children. The revenue procedure has a new table providing maximum credit amounts for other categories, income thresholds, and phase-outs.

The EITC was originally designed to be a temporary economic stimulus proposal in the Tax Reduction Act of 1975 (Nichols and Rothstein, 2015). The research findings by Greenstein and Shapiro (1998) supported the positive effects of the EITC on workforce participation and the evidence concerning the EITC's powerful effects in reducing poverty among the working poor and moderating income disparities. The paper addressed that high rates of error in the program remained a concern. This concern could led to important legislative changes and intensified administrative efforts to lower EITC rates in for resolving the disparity issues.

Another study released by Adams, Einav, and Levin (2009) regarding to consumer survey study in low-income families suggested that they most likely spent more shares of their income on the necessities and purchased mostly from their local venues. These direct economic effects resulted from EITC recipients would spend a good portion of their refund in the local areas that could in turn support local businesses and employments. Their surveys also linked the likelihood of increasing consumer spending locally during the tax refund season.

Avalos and Alley (2010), California State University researchers, have categorized the local economic impact on EITC refunds as three effects. Direct effects of EITC recipients are defined as who spend their refunds, indirect effects of business spending in response to EITC recipient spending, and induced effects of changes in household income and spending patterns caused by direct and indirect effects. The total of these effects represent the local "multiplier" effect. Their estimates for California counties concluded that the credit creates local economic impacts equivalent to at least twice the amount of EITC dollars received in many cases.

Similarly, Holmes and Berube (2015) suggested that an expanded EITC from the federal, state, or local level with options for periodic payment and better alternatives to high-cost tax preparation could provide a stronger support to low-income families and their communities. They implied the concept of "tax incidence" for reflecting the party being taxed or receiving a tax credit. It may not bear its full costs or reap its benefits, because others shift their behavior in response to the tax. They estimated that as much as 36 cents of every dollar of EITC received goes to employers, because by enabling workers to better make ends meet on low wages, the credit effectively lowered the cost of labor and increased some employments. Hence, the expanded EITC can support the growth of the local economy.

Recent study by Chetty, et. al. (2015), they emphasized that the progressive tax expenditures like the EITC can enhance intergenerational income mobility for local children, possibly by counteracting credit constraints that many low-income families face. In areas with larger state EITCs, low-income children are more likely to move up the higher income brackets over time.

With the significant impacts of EITC rates, we will focus on the improvement of the tax table. The complexity of the current EITC Table contains nine pages of the overwhelming tax amounts information. If employers would exempt from calculating the EITC for withholding income taxes, the employees will need to calculate and deduct them when they file their tax returns. The EITCs will be validated if the earned incomes are low and meet some certain standards of the tax codes. Some states often let only a partial of the EITC to be deducted in their tax returns.

The linear and gradual (LG) tax system was developed in the previous studies by Kao and Lee (2013 and 2014) to simplify the existing US progressive personal income tax rates. This LG system would eliminate the current complex Tax Tables and Tax Rate Schedules by using some condensed tax calculations. The similar process will be applied to the EITC Table for simplifying the EITC rates in the filing tax return process. The proposed method could help employees on reducing the complication of the existing income tax returns substantially.

Implications

1. Existing federal and state earned income Tax credit for individuals

There are two statuses of Married Filing Joint (MFJ) and Single/Head of Household/Qualifying Widow(er) for federal earned income tax credit (EITC). For no child lived with in 2015, AGI requirement for EITC is less than \$14,820 (<\$20,330 if MFJ). For 1 child, AGI is <\$39,131 (<\$44,651/MFJ). For 2 children, AGI is <\$44,454 (<\$49,974/MFJ). For 3 children or more) lived with you, AGI requirement is less than \$47,747 (<\$53,267 if MFJ). 2016 has similar situations: AGI requirement for EITC is less than \$14,880 (<\$20,430 if MFJ). For 1 child, AGI is <\$39,296 (<\$44,846/MFJ). For 2 children, AGI is <\$44,648 (<\$50,198/MFJ). For 3 children or more lived with you, AGI requirement is less than \$47,955 (<\$53,505 if MFJ).

Table 1 Federal Earned Income Tax Credit Table (Partial) in 2015 and 2016

Earned income (EI)	<i>Single, Head of Household or Qualifying Widow(er)</i>								<i>Married filing jointly with child number</i>							
	0		1		2		3 or more		0		1		2		3 or more	
	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
100-150	10	10	43	43	50	50	56	56	10	10	43	43	50	50	56	56
1,000-1,050	78	78	349	349	410	410	461	461	78	78	349	349	410	410	461	461
4,000-4,050	308	308	1369	1369	1610	1610	1811	1811	308	308	1369	1369	1610	1610	1811	1811
7,000-7,050	503	506	2389	2389	2810	2810	3161	3161	503	506	2389	2389	2810	2810	3161	3161
10,000-10,050	367	371	3359	3373	4010	4010	4511	4511	503	506	3359	3373	4010	4010	4511	4511
15,000-15,050	0	0	3359	3373	5548	5572	6242	6369	406	413	3359	3373	5548	5572	6242	6269
20,000-20,050	0	0	3053	3080	5145	5186	5838	5882	23	31	3359	3373	5548	5572	6242	6269
25,000-25,050	0	0	2254	2281	4092	4133	4785	4829	0	0	3136	3167	5254	5301	5948	5998
30,000-30,050	0	0	1455	1482	3039	3080	3732	3776	0	0	2337	2368	4201	4248	4895	4945
35,000-35,050	0	0	656	683	1986	2027	2679	2723	0	0	1538	1569	3148	3195	3842	3892
40,000-40,050	0	0	0	0	933	974	1626	1670	0	0	739	770	2095	2142	2789	2839
50,000-50,050	0	0	0	0	0	0	0	0	0	0	0	0	0	36	683	733

The EITC Table has 9 pages, which has about 9,568 EITC numbers. When a software program is designed, these data need certain space. Partial EITC table is shown in Table 1. It is complex for employers to calculate EITC when they do income withholding taxes on a payroll period of time. It takes time for employees to calculate EITC during filing tax returns.

EITC numbers are different when child number and tax status are different. Some EITC numbers have very slight differences between 2015 and 2016. There are four existing tax statuses for income withholdings and tax returns. There are only two tax statuses considered for EITC, which simplify existing tax statuses.

EITC table connects EI, child number and tax status. When child number is more than 3, the existing EITC Table does not show EITC numbers. There should be more benefit when child numbers are 4 or 5. It is common for a family to have 1, 2, 3, 4 or 5 children. Adjustable gross income (AGI) requirements are such as \$14,820 and \$47,747, which may be simplified into \$15,000 and \$48,000 simply. The existing 9-page EITC Table is already complex. When EITC table covers different child numbers at 0-6 and 3-4 tax statuses, then the EITC table will be very complex.

Many states also have EITC for state tax systems such as Iowa uses 18% of federal EITC as IA EITC and Kansas uses 17% of federal EITC as KS EITC.

2. The proposed federal earned income tax credit for individuals

The linear and gradual (LG) tax system has been developed to simplify existing federal and state progressive individual income systems, which simplifies complex existing tax rate schedules, withholding tables and tax tables from 10-35 pages to one page or less. The linear function in the LG tax system may be also used to simplify EITC. This paper discusses its possibility. If it is possible, then the 9-page EITC Table can be simplified to less than half page, which could be easy for employees and employers to use and reduce tax processing time and management cost for individuals and governments.

At first, the above AGI requirements may be simplified from \$14,820 to \$15,000, from \$20,330 to \$20,000, from \$47,747 to \$48,000 or from \$53,267 to \$53,000 for MFJ and other tax statuses simply. There is about \$5,000 between the two statuses such as from \$14,820 to \$20,330 (or \$15,000 to \$20,000) and from \$47,747 to \$53,267 (or \$48,000 to \$53,000). Married filing jointly (MFJ) couples have more AGI by \$5,000 comparing with other tax statuses (S).

We present a new idea about EITC rate, which is EITC over earned income (EI). When EI values are small, EIC rates (EITC/EI) are close to about 10%, 40%, 45% and 50% (2015 and 2016 EITC Tables) for child number at 0, 1, 2 and 3 respectively. The rates are 10% for child # at 0 is jumped to 40% for child # at 1. Then EITC rates are increased by 5% when increasing from 40% to 45% and 50% by child # from 1 to 2 and 3 (or more). Table 2 show EITC rates.

When EI is to \$40,000, \$44,000 or \$48,000 when child number is increased from 1 to 2 and 3 for Single, Head of Household or qualifying widow(er), EITC rates are to 0. For Married Filing Joint, EI is added about \$5,000 (Status/S) to become to \$20,000, \$45,000, \$49,000 or \$53,000 when child number is increased from 0 to 1, 2 or 3. EI Table with 9 pages and 9,568 EIC numbers can be simplified into simple Table 3 (1/4 page) with EI range, tax status, child number and EITC rate practically with 97% reduction (1-0.25/9).

Figure 1 shows EITC rates between existing EITC rate Table (Table 2) and EITC rate simplification (Table 3) for Married Filing Jointly with two children. When EI amounts are 0-\$15,000, existing EITC rates decrease slightly. When EI is >\$15,000, existing EITC rates decrease sharply. When EI amounts are \$30,000-\$49,000, existing EITC rates decrease slightly. Linear EITC rate changes are more reasonable and gradually, which are the most simple and practical.

For EITC rate simplification, linear rate= $a - EI/b$ is used (a and b are constants). EITC rates (y) against earned incomes (x) change smoothly with a constant slope $-1/b$, which is not related to EI and is the most reasonable. EITC rates are decreased when EI increased linearly. In $y=a-x/b$, y against x change smoothly, which is the most reasonable and simple. In $y=a-b/x$, slopes relate to x and always change at b/x^2 , which is not a constant and change fast or slow during certain ranges. EIC rate and EI calculations, EIC analysis, modification and projection become easy with the linear relationship.

Table 2 Federal Earned Income Tax Credit Rates (Partial) in 2015 and 2016

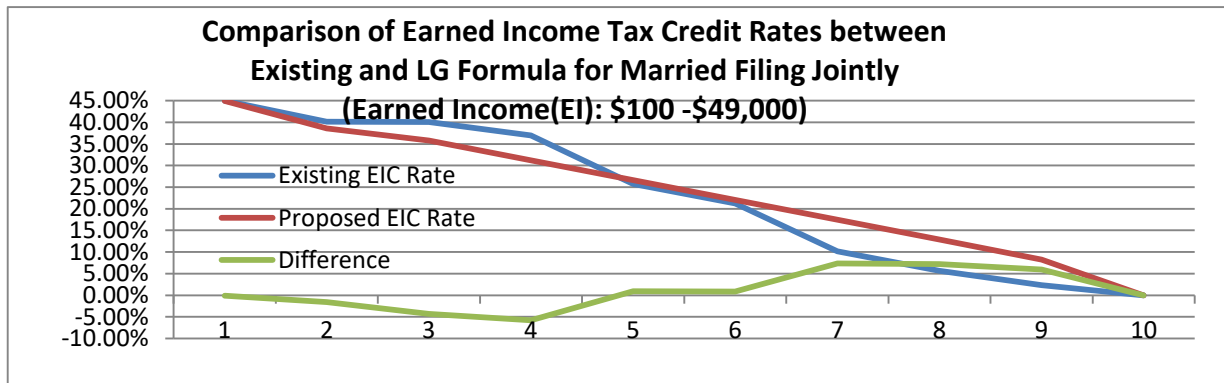
Earned income (EI)	Single, Head of Household or Qualifying Widow(er)								Married filing jointly with child #							
	0		1		2		3 or more		0		1		2		3 or more	
	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
100-150	~0.1	~0.1	~0.4	~0.4	~0.45	~0.45	~0.5	~0.5	~0.1	~0.1	~0.4	~0.4	~0.45	~0.45	~0.5	~0.5
1,000-1,050	0.08	0.08	0.35	0.35	0.4	0.4	0.46	0.46	0.08	0.08	0.35	0.35	0.4	0.4	0.46	0.46
4,000-4,050	0.077	0.077	0.34	0.34	0.4	0.4	0.453	0.453	0.077	0.077	0.34	0.34	0.4	0.4	0.453	0.453
10,000-10,050	0.04	0.04	0.34	0.34	0.4	0.4	0.45	0.45	0.05	0.05	0.34	0.34	0.4	0.4	0.45	0.45
15,000-15,050	0	0	0.224	0.225	0.369	0.371	0.415	0.424	0.027	0.027	0.224	0.225	0.369	0.37	0.415	0.417
20,000-20,050	0	0	0.15	0.15	0.26	0.26	0.29	0.294	0.002	0.002	0.168	0.169	0.277	0.279	0.312	0.313
25,000-25,050	0	0	0.09	0.091	0.164	0.165	0.19	0.193	0	0	0.125	0.127	0.21	0.212	0.238	0.24
30,000-30,050	0	0	0.049	0.0494	0.101	0.103	0.124	0.126	0	0	0.078	0.079	0.14	0.142	0.163	0.165
35,000-35,050	0	0	0.02	0.02	0.057	0.058	0.076	0.078	0	0	0.044	0.045	0.09	0.091	0.11	0.111
40,000-40,050	0	0	0	0	0.023	0.024	0.04	0.04	0	0	0.018	0.019	0.052	0.054	0.07	0.07
50,000-50,050	0	0	0	0	0	0	0	0	0	0	0	0	0	0.001	0.014	0.015
53,000-53,050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.002

Table 3 Earned Income Tax Credit Rate Simplification to Match EITC Table (9 pages)

S=0 for Single, HH or qualifying widow(er) or S=5,000 for Married Filing Joint (Status (S) _____ and Child # __)

Child #	Earned Income (EI) Range	Earned Income(EI)	Earned Income Tax Credit Rate by Linear formula	Rate	Range check	EITC EI*Rate
0	0 – (15,000+S)		0.1 (1 - EI / (15,000+S))		0.1-0	
1	0 – (40,000+S)		0.4 (1 - EI / (40,000+S))		0.4-0	
2	0 – (44,000+S)		0.45 (1 - EI / (44,000+S))		0.45-0	
3/more	0 – (48,000+S)		0.5 (1 - EI / (48,000+S))		0.5-0	

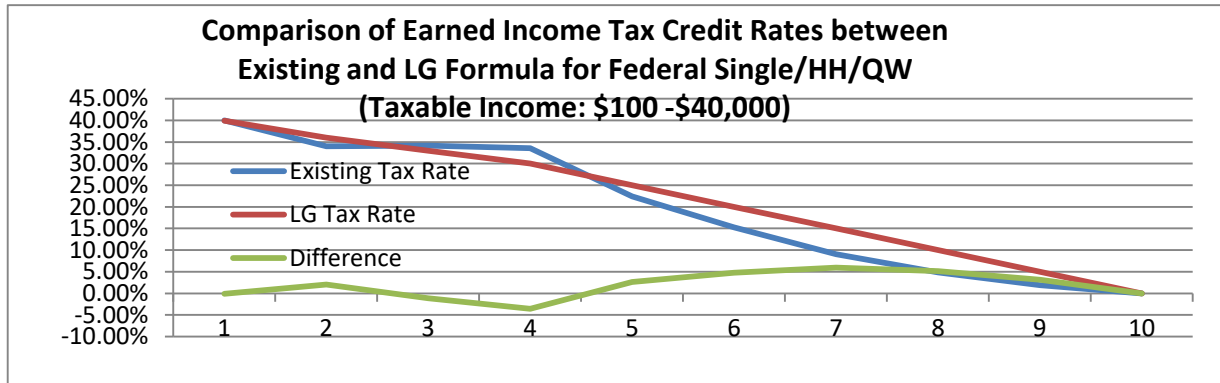
Figure 1 EITC Rates of Existing EITC Table and Linear Formula with Two Children



EI: 1=\$100, 2=\$7,000, 3=\$10,000, 4=\$15,000, 5=\$20,000, 6=\$25,000, 7=\$30,000, 8=\$35,000, 9=\$40,000, and 10=\$49,000

Figure 2 shows EITC rates between existing EITC rate Table (Table 2) and EITC rate simplification (Table 3) for Head of Household or qualifying widow(er) with one child. When EI amounts are 0-\$10,000, existing EIC rates decrease slightly. When EI is >\$10,000, existing EITC rates decrease sharply. When EI amounts are \$25,000-\$40,000, existing EITC rates decrease slightly. Linear EITC rate changes are more reasonable and gradually.

Figure 2 EITC Rates of Existing EITC Table and Linear Formula with One Child



EI: 1=\$100, 2=\$4,000, 3=\$7,000, 4=\$10,000, 5=\$15,000, 6=\$20,000, 7=\$25,000, 8=\$30,000, 9=\$35,000, and 10=\$40,000

Total EITC can be calculated or projected by the following formulas. For MFJ, S=5,000, total EITC is calculated by:

$$\text{Total EITC} = 0.1 \sum EI_m + \sum (EI^2)_m / 200000 + 0.4 \sum EI_n + \sum (EI^2)_n / 125000 + 0.45 \sum EI_p + \sum (EI^2)_p / 108889 + 0.5 \sum EI_q + \sum (EI^2)_q / 106000$$

For the other tax statuses, S=0, total EIC is calculated by:

$$\text{Total EITC} = 0.1 \sum EI_a + \sum (EI^2)_a / 150000 + 0.4 \sum EI_b + \sum (EI^2)_b / 100000 + 0.45 \sum EI_c + \sum (EI^2)_c / 97777.8 + 0.5 \sum EI_d + \sum (EI^2)_d / 96000$$

The proposed one linear line is the most simple and reasonable with linearly rate changes and constant slope. Two linear lines may be found to match existing EITC Table closely with such as $0.42 - EI/214,285.7$ (for EI 0-15,000) and $0.525 - EI/85,714.3$ (for EI 15,000-44,000). There are the two different slopes for EITC rate changes over EI. The first slope $-1/214,285.7$ shows less EIC rate changes over EI than the second slope $-1/85,714.3$. It means EITC rate decreases over EI during EI 15,000-44,000 much fast than during 0-15,000, which means it is not fair for EI 15,000-44,000. The two linear relationships are more complex and unfair, which are not suggested.

EITC rate for tax return, withholding and computer program: When employers and employees calculate EITC rate and EITC, EITC rate range check is used for reducing calculation mistakes. A computer program may be designed to calculate EITC rate and EITC automatically for tax returns and withholding taxes when related child number, tax status, EI and formula are used. Then EITC rate and EITC are outputted on a display. Yearly EITC is divided by a payroll period factor such as bi-weekly, weekly, semi-monthly or monthly, 26, 52, 24 or 12 is used to divide yearly EITC.

Tax status, child number, withholding, EITC rate formula, reform and issue: EITC analysis and projection are calculated after knowing EI and EI^2 . The two existing tax statuses for EIC may be improved to three tax statuses of (1) Single (S=0), (2) Married Filing Joint (S=5,000), (3) Head of Household or Qualifying Widow(er) (S=2,500). Table 4 covers more tax statuses and child numbers. We need to consider EITC system reasonably and simply.

After child number is from 1 to 2 or 3, earned income range is increased by \$4,000 and EITC rate is increased by 5% when child number is increased by one. Child numbers may be from 0 to 1, 2, 3, 4, 5, 6 and 7 (C) instead of existing 0-3 to meet most actual situations with different child numbers 0-7. When child numbers are 5, earned income range is increased to 0-\$61,000 ($40,000 + 4,000 * (5-1) + 5,000 = 40,000 + 16,000 + 5,000 = 61,000$) for Married Filing Jointly and EITC rate range is decreased from 60% ($0.4 + 0.05 * (5-1) = 0.6$) to 0.

Table 4 Federal Earned Income Tax Credit Rate Simplification with Different Child Numbers (C=0-7)
 S=0 for Single, S=2,500 for Head of Household or Qualifying Widow(er) or S=5,000 for Married Filing Jointly
 (Status (S) and Child Number (C: 1-7))

Child#	Yearly EI Range	Earned Income(EI)	Earned Income Tax Credit Rate by Linear formula	Rate	Range check	EITC EI*Rate
0	0– (15,000+S)		$0.1 (1 - EI * F / (15,000 + S))$		0.1 - 0	
1	0 – (40,000+S)		$0.4 (1 - EI * F / (40,000 + S))$		0.4 - 0	
2	0 – (44,000+S)		$0.45 (1 - EI * F / (44,000 + S))$		0.45 - 0	
...	0 – (40,000+ 4,000*(C-1)+S)		$(0.4 + 0.05 * (C - 1)) (1 - EI * F / (40,000 + 4,000 * (C - 1) + S))$		$0.4 + 0.05 * (C - 1) - 0$	

In Tables 3 and 4, EI is yearly basis. When EI is based on a payroll filing period (F) by employers, then EI*F is used. F is 1, 2, 4, 12, 24, 26, 52 or 365 (yearly, semi-yearly, quarterly, monthly, semi-monthly, bi-weekly, weekly or daily). A computer program may be designed for employers to use, which may help many employees with low and mid incomes to not file normal tax returns with tax withholding reports (more detail than W-2) with or without minor modification.

For EITC rate reform, there are several factors can be adjusted. EITC rates can be reformed by adjusting related EITC rate range, EI range, child number and tax status. Adjusting EIC rate range is the most efficient way for EITC reform. It is the simplest to reform EITC rate range such as from 0.4-0 to 0.42-0 or from 0.45-0 to 0.44-0. EI or EI (or AGI) range may be reformed such as from 0-\$15,000 to 0-\$14,850 or from 0-\$40,000 to 0-\$41,000. S value may also be reformed such as S=0 for Single, S=2,000 for Head of Household, S=3,000 for Qualifying Widow(er) or S=5,000 for Married Filing Jointly, which depends on actual situations.

Comparing with other tax credits of child tax credit, education credit, credit for child and dependent care expenses and American opportunity credit, earned income tax credit (EITC) is the most complex credit to be calculated. It is suggested to use Table 3 or 4 to simplify EITC rate and EITC. Current EITC is a credit for certain working people, which gives a refund even having no any tax or having no any tax withheld. Also EITC covers so many tax returns. Many employees need to file tax returns because of their EITC, which also cause the federal and state revenue departments to process these tax returns.

2016 federal poverty guidelines are shown in Tables 5 and 6. The federal poverty guidelines are lower than EI ranges, which mean both the federal and state revenue departments and social service department need to deal with same cases. So many employees involve EITC. More government work is involved. Such as for a married filing jointly with two children, their 2016 federal poverty guideline is \$24,300 and EI range is less than \$49,000. For the married couples (with the two children) with earned income less than EI 24,300, federal and state revenue departments need to check EITC for the couples. The couples also need to calculate EIC for their tax returns at first. Social service department also needs to do how much financial support for the couples. When the couple has EI at \$24,300, their EITC rate is 22.4% ($5449 / 24,300 = 22.4\%$) from 2016 EITC Table or 22.3% from the formula in Table 3 ($0.45 - 24,300 * 44,000 / ((44,000 + S) * 97,777.8) = 22.3\%$).

Many tax returns have EITC, which take time for federal and state governments to inspect EITC. For reducing tax processing time and costs, it is much more efficient to not let federal and state revenue departments to do EITC because they need to do so many tax returns with EITC, which reduce processing time and costs. Social service department and certain groups of people with or without working incomes can work together to find how much EITC and financial support needed for different groups of people. One key benefit is to let certain working people with certain low incomes to not pay income tax. Then the three parties of the certain working people, federal and state revenue departments do not need to do related work, which can save significant time and costs for many tax returns. Social service department take care certain groups of people. For example \$100 million is used, in which government costs is \$50 million and \$50 million is used for related people. Our purpose is to let such as \$80 million or more to be used for related people and \$10 million is its cost and \$10

million is saved as an emergency fund. Then such costs will be decreased by such as 80% $((50-10)/50=80\%)$ and more money is used for related people by increasing from 50% to 90%.

The United States has about 138 million federal tax returns in 2013. It is reported taxpayers had \$9.03 trillion in AGI and paid \$1.23 trillion in income taxes in 2013. The top 50% of all taxpayers paid 97.2% of all income taxes and the bottom 50 percent paid 2.8% only in 2012. There are many tax returns with low or no tax liabilities. The federal and state revenue departments need to process those tax returns with extra time and costs by existing tax systems. Our purpose is to reduce tax processing time and costs with the simplified LG tax rate system without effecting tax revenue.

2016 standard deduction for single or married filing separately is \$6,300 and for married filing jointly is \$12,600. 2016 standard exemption deduction is \$4,050. One single person has the standard deductions at \$10,350 $(6,300+4,050)$, which is close to \$11,880. One married couple has the standard deductions at \$20,700 $(12,600+4,050*2)$, which is higher than \$16,020. Employees with below standard deductions do not need to pay income taxes. Federal poverty guidelines can be used as income references.

Table 5 2016 Federal Poverty Guidelines (\$) for Persons in family/household (48 States and the District of Columbia)

Persons	1	2	3	4	5	6	7	8 *
2016	\$11,880	\$16,020	\$20,160	\$24,300	\$28,440	\$32,580	\$36,730	\$40,890

* For families/households with more than 8 persons, add \$4,160 for each additional person.

Table 6 2016 Poverty Guidelines (\$) for Persons in family/household (Alaska and Hawaii)

Persons	1	2	3	4	5	6	7	8 *
Alaska	\$14,840	\$20,020	\$25,200	\$30,380	\$35,380	\$40,740	\$45,920	\$51,120
Hawaii	\$13,670	\$18,430	\$23,190	\$27,950	\$32,710	\$37,470	\$42,230	\$47,010

* For families/households with more than 8 persons, add \$5,200 in Alaska or \$4,780 in Hawaii for each additional person.

3. The proposed state earned income credit for individual tax credits

Many states often let employees with certain AGI requirements to have EITC for state tax systems such as Kansas uses 17% of federal EITC as KS EITC and Iowa uses 18% of federal EITC as IA EITC. Some states have certain programs such as food sales tax credit to take care people with low incomes.

States usually use a percent of federal EIC as their state EIC without their own EIC systems. They have to meet federal EITC conditions and regulations. When federal change its tax system significantly, these states have to change their tax systems. Some changes from the federal government may not fit to state situations, so those states have to change Also, some states use the federal AGI as state AGI or federal taxable income as state taxable income. Federal AGI is relatively stable, however, federal taxable income has changed more frequent, which is depend on the federal regulations and calculations.

For Kansas, Table 7 shows 17% of federal EITC as KS EITC. Its EITC rates are changed from 0.1-0 to 0.017-0, from 0.4-0 to 0.068-0, from 0.45-0 to 0.0765-0 and from 0.5-0 to 0.085-0 for different tax statuses, child numbers and EI values.

Table 7 KS Earned Income Credit Simplification (KS EITC = 17%*Federal EITC)

S=0 for Single/Married Filing Separate, Head of Household or Qualifying Widow(er)) or S=5,000 for Married Filing Joint.

Child #	Earned Income (EI) Range	EI	Earned Income Credit Rate formula	Rate	Range check	EITC EI*Rate
0	0 - 15,000+S		$0.017(1 - EI / (15,000+S))$		0.017-0	
1	0 - 40,000+S		$0.068 (1 - EI / (40,000+S))$		0.068-0	
2	0 - 44,000+S		$0.0765 (1 - EI / (44,000+S))$		0.0765-0	
3/more	0 - 48,000+S		$0.085 (1 - EI / (48,000+S))$		0.085-0	

Example: A Kansas taxpayer, who files Married Filing Jointly with two children, has EI \$24,300. When Tables 3 and 7 are used, his federal EITC and KS EITC are calculated as below:

$$\text{Federal EITC rate} = 0.45 - 0.45 * 24,300 / (44,000 + 5,000) = 0.45 - 0.22316 = 0.22684 \dots\dots\dots (1)$$

$$\text{Federal EITC} = \text{federal EITC rate} * 24,300 = \$5,512.13 \dots\dots\dots (2)$$

$$\text{KS EITC rate} = 0.0765 - 0.765 * 24,300 / (44,000 + 5,000) = 0.0765 - 0.03794 = 0.03856 \dots\dots\dots (3)$$

$$\text{KS EITC} = \text{state EITC rate} * 24,300 = \$937.06 \dots\dots\dots (4)$$

When one married couples (with the two children) has earned income EI \$24,300 (2016 federal poverty guidelines), their federal EITC is \$5,449 at 22.42% (5,449/24,300). KS state EITC rate is \$926.33 at 3.8% (17%*5,449/24,300=3.8%) from 2016 EITC Table or 3.856% from the formula in Table 3 (0.0765-24,300*44,000/((44,000+S)*575,163.4)=3.856%). KS state EITC rate and EITC are 17% of the federal EITC rate and EITC, KS state revenue department needs to check EITC for certain working people with certain EI ranges. These people also need to do EITC for their tax returns. Social service department may also need to do how much financial support for many people with less poverty guidelines. Both state revenue department and social service department need to deal with same cases. Such as for a married filing jointly with two children, their 2016 federal poverty guideline is \$24,300 (Table 5) and KS EI range is much less at 17% (Table 7). So many employees involve EITC. More government work is involved.

In Kansas, if a child (<18) who lived with you all year, you are 55 or older, totally and permanently disabled or blind all year with state AGI <\$30,615, then food sale tax credit is \$125*(exemption#-dependent# (18 or older)). Food sale tax credit is simpler than earned income credit. Yearly basic child living cost is a constant number, which does not depend on EI.

Comparing with child tax credit and KS food sale tax credit, EITC is much more complex to be figured out. It is suggested to use simple EITC rate simplification such as Tables 3 and 7 to simplify federal and state EITC for simplification purpose. It is also suggested to use some child credit/deduction, low tax rate, no tax liability under poverty lines for low incomers with or without children or for government social service departments to work together to manage financial supports or similar EITC simplification for certain groups of people, which can reduce tax processing time and cost.

Conclusion

The complication of the U.S. federal and state earned income tax credit systems have been reviewed and simplified in this paper. The proposed new linear formula has been used to replace complex earned income tax credit table with 9 pages and 9,568 EITC numbers. This paper converts earned income tax credit into the earned income credit rate first and presents

the matched linear formulas, which would provide a much simpler way than the EITC tables for federal and state earned income tax credit calculations.

Overall, this proposed EITC Table can condense into linear EITC rates for the simplified calculations. Child number, earned income, tax status, earned income range, and earned income credit rate range are included in the formula. Employers and governments can possibly calculate the EITC for employees straightforward and practically. The proposed EITC simplification system could also create a further benefit to the employees who file non-complex tax calculations have an option of not-filing normal tax returns. This proposed method can not only reduce tax processing time with costs for employees and governments on earned income tax credit, but also benefit on tax analysis, reform, and projection.

References

- Adams, W., Einav, L., and Levin, J. (2009). Liquidity constraints and imperfect information in subprime lending. *American Economic Review*. 99(1), 49–84. Website source: <http://web.stanford.edu/~jdlevin/Papers/Liquidity.pdf>.
- Avalos, A., and Alley, S. (2010). The economic impact of the Earned Income Tax Credit (EITC) in California. *California Journal of Politics and Policy*. 2(1). Website source: <http://escholarship.org/uc/item/2jj0s1dn>.
- Bryan, Bob (2017), "IT'S HERE: All the details of Trump's massive tax plan," *Business Insider*, Website source: http://www.businessinsider.com/trump-tax-plan-details-corporate-rate-individual-brackets-deductions-cuts-2017-9?pt=385758&ct=Sailthru_BI_Newsletters&mt=8
- Chetty, R., Hendren, N., Kline, P., and Saez, E. (2015). The economic impacts of tax expenditures: Evidence from spatial variation across the U.S. Website source: <http://www.irs.gov/pub/irs-soi/14rpttaxexpenditures.pdf>
- Greenstein, Robert and Isaac Shapiro (1998), "New Research Findings on the Effects of the Earned Income Tax Credit," *New Research Findings on the Effects of the Earned Income Tax Credit*, Center on Budget and Policy Priorities, March 11. Website Resource: <https://www.cbpp.org/archives/311eitc.htm>.
- Hatch, Orrin G. and Ron Wyden (2013), "The U.S. Senate Finance Committee, "Simplifying the Tax System For Families and Businesses," Staff Tax Reform Options for Discussion, March 21.
- Kao, Robert and John Lee (2013), "The U.S. Personal Income Tax Reform: Linear and Gradual Tax Simplifications," *Academy of Economics and Finance Journal*, Volume 4, 47-55.
- Kao, Robert and John Lee (2014), "US Federal and State Corporate Tax Simplification," *Journal of Business and Economics*, ISSN 2155-7950, USA, Volume 5, No. 9, pp. 1473-1483, Volume 5.
- Lacijan, Charles A., "IRS Oversight Board Annual Report to Congress 2010," IRS Oversight Board, April 2011.
- Loving, Sabina, et al. Plaintiffs, v. Internal Revenue Service, et al. Defendants (2014). Civil Action No. 12-385, James E. Boasberg, The United States District Court For the District of Columbia, Sep. 19.
- Natalie Holmes and Alan Berube (2015), "The Earned Income Tax Credit and Community Economic Stability," Washington, DC: Brookings Institution. Website source: <https://www.brookings.edu/articles/the-earned-income-tax-credit-and-community-economic-stability/>, November 20.
- Nichols, A., and Rothstein, J. (2015). The Earned Income Tax Credit (EITC) (NBER Working Paper Series no. 21211). Website source: <http://www.nber.org/papers/w21211.pdf>
- IRS (2016), www.federalregister.gov/documents/2016/01/25/2016-01450/annual-update-of-the-hhs-poverty-guidelines
- IRS (2018), <https://www.eitc.irs.gov/eitc-central/about-eitc/about-eitc>