PENN WHARTON
UNIVERSITY *of* PENNSYLVANIA

Budget Model

How Does Accounting for Population Change Affect Estimates of the Effect of Immigration Policies on the Federal Budget?

By Douglas Elmendorf and Heidi Williams[1]

Summary: We report estimates from the Penn Wharton Budget Model (PWBM) that exempting employment-based green cards from statutory limits for applicants (and their families) who have earned a doctoral or master's degree in a STEM field---similar to Section 80303 in H.R. 4521---would reduce federal budget deficits by $129 billion from 2025 to 2034. In contrast, a conventional budget estimate, which would include projected increases in federal spending but not the effect of a larger population on federal tax revenues, shows an increase in federal deficits of $4 billion.

Key Points

- Conventional budget estimation assumes that legislative proposals will not change the number of workers in the economy, because such changes would affect GDP, which is assumed to remain unchanged. On a conventional basis, immigration proposals similar to Section 80303 in H.R. 4521 have been estimated by CBO (CBO 2022) and PWBM (Table 1) to increase federal spending, primarily due to greater subsidies for health insurance purchased on the Affordable Care Act exchange, and thereby to increase federal budget deficits.

- However, many legislative proposals to change immigration policies would in fact change the number of workers as a direct consequence and fundamental objective of the legislation. An approach to budget estimation that incorporates projected changes in population provides a more accurate estimate of the budgetary effects of changes in immigration policy. Under such a population-change approach, immigration proposals similar to Section 80303 in H.R. 4521 have been estimated by CBO (CBO 2014) and PWBM (Table 1) to decrease federal budget deficits, as increased collections of individual income taxes and payroll taxes more than outweigh the additional spending.

- Following the population-change approach of incorporating all of the direct budgetary effects of changing the number of people in the United States, the analysts at PWBM estimate that a proposal similar to

Section 80303 in H.R. 4521 would raise federal spending by $4 billion and increase federal revenues by $133 billion from 2025 to 2034, for a net decrease in the federal budget deficit of $129 billion.

- Over the following decade, the difference between estimates under the conventional approach and the population-change approach is even larger, from a $74 billion increase in the budget deficit under the conventional approach to a $634 billion decrease under the population-change approach.

> **NOTE:** Budgetary Effects of Granting Green Cards to Immigrants with Advanced STEM Degrees provides background on estimates presented in this brief.

The Congressional Budget Office (CBO), sometimes in collaboration with the staff of the Joint Committee on Taxation (JCT), has produced estimates of the budgetary impact of proposals to change immigration laws that have used three different approaches:

- *Conventional approach.* These estimates reflect a range of expected behavioral responses—for example, likely changes in the number of people who claim government benefits—except for any responses that would affect gross domestic product (GDP)—for example, changes in the number of workers—because GDP is assumed to remain unchanged. This approach has been used for most immigration proposals—such as for H.R. 4521, Section 80303 (CBO 2022).

- *Population-change approach.*[2] These estimates reflect the behavioral responses included in conventional estimates and also all of the direct budgetary effects of changing the number of people in the United States—in particular, the effects on taxable compensation and therefore on income and payroll tax revenues—but they do not incorporate all of the effects on the economy that CBO expects would occur. This approach has been applied to four legislative proposals—for H.R. 2131 (CBO 2014), S. 744 (CBO 2013a), Senate Amendment 1150 to S. 1348 (CBO 2007a, CBO 2007b), and S. 2611 (CBO 2006a, CBO 2006b).

- *Dynamic approach.* These estimates reflect the budgetary impact of all of the economic changes that CBO expects would occur. This approach has been applied twice, although not as the basis for official budget estimates—for S. 744 (CBO 2013b) and for S. 2611 (CBO 2006a).

At various times in the past decade, the House of Representatives has adopted a rule that CBO and JCT provide dynamic estimates for "major" legislation. However, no immigration proposal during that period has met the criteria to be designated as "major," and therefore no dynamic budgetary estimates have been produced in the past decade. In the two earlier instances when the dynamic approach was applied, the estimated budgetary effects were fairly similar to the estimated budgetary effects using the population-change approach over the first ten years of the estimation period.

By contrast, estimated budgetary effects using the population-change approach can be starkly different from estimated budgetary effects using the conventional approach. Understanding those differences is crucial for Members of Congress and their staffs as they work with CBO and JCT to evaluate possible changes in immigration laws. In this policy brief, we provide a direct comparison of conventional approach and population-change

approach budget estimates for an illustrative policy—similar to H.R. 4521, Section 80303 (CBO 2022)—that would increase the availability of green cards for foreign nationals who are advanced degree holders in the fields of science, technology, engineering, or mathematics (STEM). Specifically, we present budget estimates for exempting employment-based green cards (EB-1, EB-2, EB-3) from statutory limits for applicants who have earned a doctoral or master's degree in a STEM field at a US research institution or foreign equivalent; the cap exemption applies to the principal immigrant as well as their accompanying spouse and minor children.

The estimates we present come from the Penn Wharton Budget Model (PWBM), which is a nonpartisan, research-based initiative at the Wharton School at the University of Pennsylvania that provides economic analysis of the budgetary impact of proposed policy changes. Following the conventional approach, the analysts at PWBM estimate that the proposal would increase federal spending by about $4 billion and have a negligible effect on federal revenues over the 10-year period from 2025 to 2034, leading to a net increase in the federal budget deficit of about $4 billion. By contrast, following the population-change approach of incorporating all of the direct budgetary effects of changing the number of people in the United States, the analysts at PWBM estimate that the proposal would increase federal revenues by $133 billion (and raise federal spending by the same $4 billion as in the conventional estimate) for a net decrease in the federal budget deficit of about $129 billion from 2025 to 2034.

Over the following decade, the difference between the conventional approach and population-change approach estimates is even larger: swinging from a $74 billion increase in the budget deficit to a $634 billion decrease.

Background

In a 2015 report, CBO explained its rationale for using different approaches to estimating the budgetary effects of legislative proposals affecting immigration (CBO 2015, Box 2):

> Following the long-standing convention of not incorporating macroeconomic effects in cost estimates—a practice that has been followed in the Congressional budget process since it was established in 1974—cost estimates produced by the Congressional Budget Office (CBO) and by the staff of the Joint Committee on Taxation (JCT) typically reflect the assumption that macroeconomic variables such as gross domestic product (GDP) and employment remain fixed at the values they are projected to reach under current law. Thus, when estimating the potential effects of legislative proposals on the federal budget, CBO and JCT generally assume that before-tax wages, the labor supply, and other characteristics of the overall economy would not change as a result of the legislation. (In most cases, those effects would be negligible.) This convention has been followed in estimating the costs of legislation that would make small changes to immigration policy.

> A change in immigration policy that substantially increased the total population of the United States, however, would cause significant changes in the labor force that were a direct consequence and fundamental objective of the legislation. The magnitude of those changes would depend on the net change in immigration under the policy, as well as how such factors as labor force participation, unemployment rates, average hours of work, and average wages would differ under the policy in comparison with CBO's baseline projections.

> In such cases, CBO and JCT have relaxed the standard assumption of not accounting for macroeconomic effects of legislation. An example is the cost estimate for S. 744, the Border Security, Economic Opportunity, and Immigration Modernization Act, as reported by the Senate Judiciary Committee in June 2013. That bill

would have significantly increased the size of the U.S. labor force: Relative to CBO's projections under then current law, enacting that version of S. 744 would have increased the size of the labor force by about 6 million (about 3.5 percent) in 2023 and by about 9 million (about 5 percent) in 2033, CBO and JCT estimated. Employment would have been expected to increase as the labor force expanded because many of the additional immigrants would seek jobs and the larger population would boost demand for goods and services and, in turn, the demand for labor.

But following the standard convention of assuming that employment would remain unchanged relative to current law would have implied that any employment of the additional immigrants would be offset one-for-one by lower employment elsewhere in the population. Because that outcome would be highly implausible, CBO and JCT relaxed the assumption of fixed GDP and employment and incorporated into the cost estimate their projections of the legislation's direct effects on the U.S. population, employment, and taxable compensation, which primarily affected the amount of additional tax revenues that would have resulted from enacting the bill.

Nevertheless, to remain as consistent as possible with the estimating rules that CBO and JCT follow for almost all other legislation, the cost estimate for S. 744 did not incorporate the budgetary impact of every economic consequence of the bill. Rather, in a separate report that accompanied the cost estimate, CBO described the effects that were not taken into account in that estimate (specifically, changes in the productivity of labor and capital, the income earned by capital, the rate of return on capital—and therefore the interest rate on government debt and the differences in wages for workers with different skills) and the additional budgetary effects that would ensue.

Different approaches to cost estimation—conventional, population-change, and dynamic—can result in divergent estimates of federal budgetary effects for similar policies. For example, H.R. 4521, Section 80303, and H.R. 2131 are similar in that both would increase the availability of green cards for foreign nationals who are advanced degree holders in STEM fields:

- CBO's conventional estimate of H.R. 4521, Section 80303—which excluded effects on taxable compensation and therefore on income and payroll tax revenues—was for an *increase* in the federal budget deficit of about $3 billion from 2022 to 2031.

- CBO's population-change estimate of H.R. 2131—which included effects on taxable compensation and therefore on income and payroll tax revenues—was for a *decrease* in the federal budget deficit of about $110 billion from 2014 to 2024.

The fact that these different approaches can lead to estimated budgetary effects for similar proposals that differ in sign is especially problematic because the sign of the estimated effect of a proposal on the deficit is especially salient in the legislative process: Proposals that are estimated to increase deficits are subject to additional points of order and other procedures that affect their consideration by Congressional committees and by the full House or Senate.

Methods

We present budget estimates generated by analysts at the Penn Wharton Budget Model for a representative policy in the spirit of H.R. 4521, Section 80303 (CBO 2022): an exemption of employment-based green cards (EB-1, EB-2, EB-3) from statutory limits for applicants who have earned a doctoral or master's degree in a STEM field at a U.S. research institution or foreign equivalent; the cap exemption applies to the principal immigrant as well as their accompanying spouse and minor children.[3]

This type of policy change would change both the total population of the United States and who among that population has legal permanent residency status versus nonimmigrant status, and each of these channels has potential budgetary impacts. For example, changes to the immigration status of individuals already in the country could have budgetary impacts by affecting eligibility for federal benefits, as CBO notes that immigrants without permanent residency status are sometimes not eligible for programs that immigrants with such status are. Esche, Neufeld, and Williams (2024) estimate the changes in population counts that would result from this type of policy change, and the PWBM analysts use those estimates in their modeling frameworks.

For these estimates, the PWBM analysts assume that the bill would be enacted during fiscal year 2025. For simplicity, the budget estimates presented here do not include any fees or costs associated with applications or other aspects of immigration processing. Because such effects would be handled in an identical manner under the conventional and population-change approaches, excluding the effects does not matter for comparing estimates under those approaches.

Estimates

The PWBM analysts estimate that enacting this proposal would increase so-called direct spending (that is, spending controlled by laws other than appropriation acts) by about $4 billion over the 2025-2034 period (see Table 1). Most of these outlays would reflect increased spending on subsidies for health insurance purchased on the Affordable Care Act exchanges and on other health care programs. Under conventional methods that ignore the changes in the size of the U.S. population, the proposal is estimated to have a negligible effect on federal revenues over the 10-year period from 2025 to 2034. Thus, the conventional estimate is that the proposal would lead to a net increase in the federal budget deficit of $4 billion.

However, when incorporating the changes in the size of the U.S. population, the PWBM analysts estimate that enacting this proposal would increase revenues by $133 billion over the 2025-2034 period (see Table 1). The revenue estimates reflect additional collections of individual income taxes (about two-thirds of the total) and payroll taxes (about one-third of the total) that would result primarily from an expansion of the U.S. labor force. Hence, the population-change approach of incorporating all of the direct budgetary effects of changing the number of people in the United States implies that the proposal would increase federal revenues by $133 billion (and raise federal spending by the same $4 billion as in the conventional estimate) for a net *decrease* in the federal budget deficit of $129 billion from 2025 to 2034.

Table 1. Estimated budgetary effects, 2025-2034

Billions of dollars

[DOWNLOAD DATA]

Fiscal Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2025-2034
Increases or Decreases (-) in Direct Spending											
Outlays	0.1	0.2	0.3	0.2	0.3	0.4	0.5	0.5	0.6	1.1	4.2
Increases or Decreases (-) in Revenues											
Revenues	2.0	3.2	5.3	9.9	16.7	19.7	19.4	15.9	17.9	22.8	132.8
Net Increases or Decreases (-) in the Primary Deficit											
Effect on the deficit	-1.9	-3.0	-5.0	-9.7	-16.5	-19.3	-18.9	-15.4	-17.2	-21.7	-128.6

Source: Penn Wharton Budget Model
Components may not to sum to totals due to rounding.

The proposal we are studying would have substantial effects on the size and composition of the U.S. population and labor force in the long run. Therefore, the PWBM analysts also estimated budgetary effects of the proposal for the ten years following the standard 10-year budget window. For the 2035-2044 period, the difference between estimates that do and do not capture the direct effects of changes in population is even larger than during the 10-year budget window: swinging from a $74 billion increase in the budget deficit under the conventional approach to a $634 billion decrease in the budget deficit under the population-change approach (see Table 2).

Table 2. Estimated budgetary effects, 2035-2044

Billions of dollars

DOWNLOAD DATA

| Fiscal Year	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2035-2044
Increases or Decreases (-) in Direct Spending											
Outlays	1.9	2.7	3.8	5.3	7.3	8.5	9.3	10.6	11.8	12.7	73.9
Increases or Decreases (-) in Revenues											
Revenues	29.9	37.5	47.6	61.3	75.2	81.6	82.4	86.6	98.1	107.9	708.1
Net Increases or Decreases (-) in the Primary Deficit											
Effect on the deficit	-28.0	-34.8	-43.8	-55.9	-67.9	-73.2	-73.1	-76.0	-86.4	-95.2	-634.2

Source: Penn Wharton Budget Model
Components may not to sum to totals due to rounding.

The difference between the conventional approach and population-change approach budget estimates begins to widen substantially in the ninth year after the policy is implemented and continues to widen thereafter (see Figure 1). This pattern arises because of the projected lag in new immigrants naturalizing and sponsoring immediate relatives.

Figure 1. Estimated Effect on the Deficit, Conventional Basis and Population-Change Approach

Billions of dollars

DOWNLOAD DATA
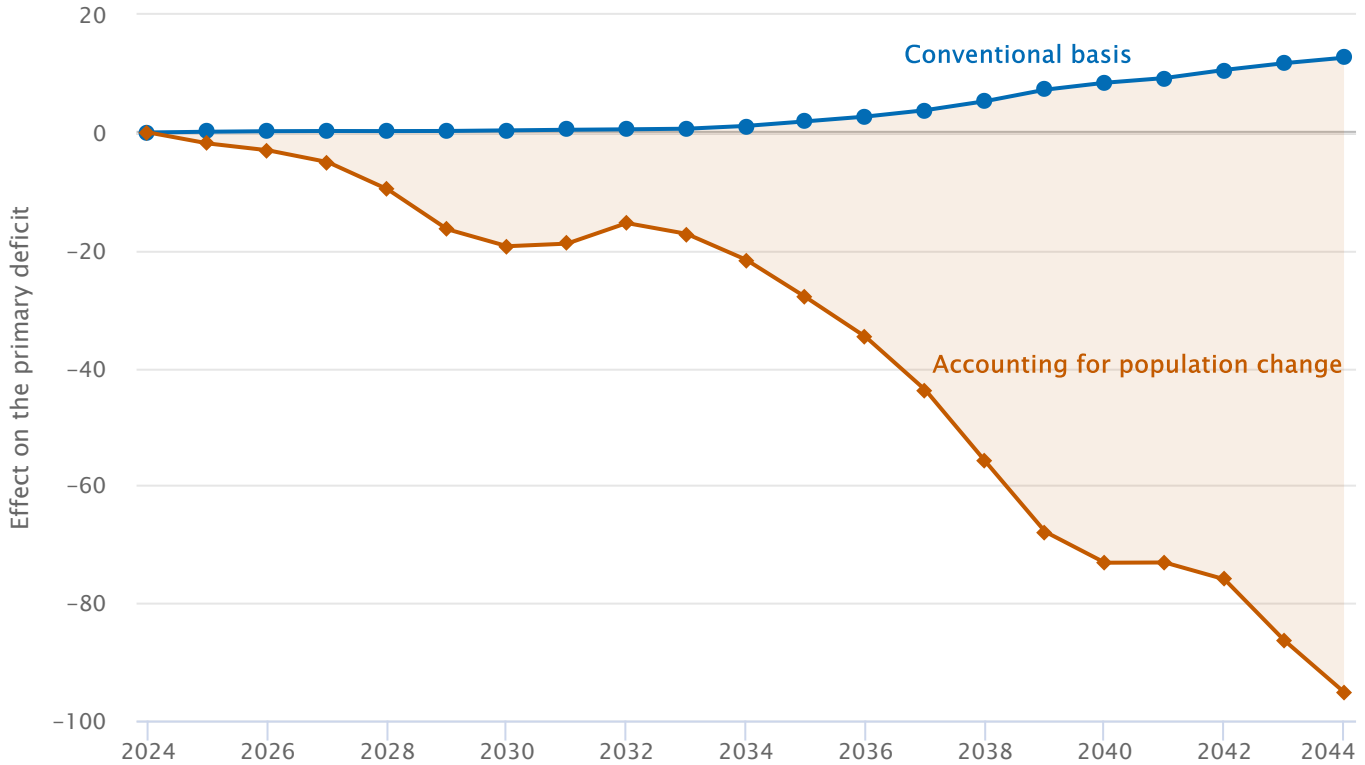
Source: Penn Wharton Budget Model

Conclusion

As noted by CBO (CBO 2015), changes in immigration policy that increase the total population of the United States would generate changes in the labor force as a direct consequence and fundamental objective of those changes. Moreover, CBO has recognized that because conventional budget estimates hold employment unchanged relative to current law, such estimates do not fully capture the budgetary impact of proposed changes in immigration policy. An alternative approach to budget estimation—the population-change approach—captures the direct budgetary impact of changing the number of people in the United States, in particular by increasing compensation and therefore increasing income and payroll tax revenues. This population-change approach has been applied to four legislative proposals—H.R. 2131 (CBO 2014), S. 744 (CBO 2013a), Senate Amendment 1150 to S. 1348 (CBO 2007a, CBO 2007b), and S. 2611 (CBO 2006a, CBO 2006b)—but has not been applied to any proposals since 2014.

Our goal in undertaking this work is to provide additional information to CBO and JCT, to Congress and the relevant Congressional committees, and to the public about the implications of the choice of estimation approach for legislative proposals addressing immigration. The budget estimates presented in this policy brief show that

conventional and population-change approaches can result in sharply divergent estimates of the federal budgetary impact of at least some immigration-related legislative proposals.

References

Congressional Budget Office (2006a) "S. 2611, Comprehensive Immigration Reform Act of 2006," https://www.cbo.gov/publication/17779.

Congressional Budget Office (2006b) "S. 2611, Comprehensive Immigration Reform Act of 2006," https://www.cbo.gov/publication/18065.

Congressional Budget Office (2007a) Preliminary review of Senate Amendment 1150, https://www.cbo.gov/sites/default/files/110th-congress-2007-2008/costestimate/05-23-immigration0.pdf.

Congressional Budget Office (2007b) "Senate Amendment 1150 to S. 1348, the Comprehensive Immigration Reform Act of 2007," https://www.cbo.gov/sites/default/files/110th-congress-2007-2008/costestimate/sa1150june40.pdf.

Congressional Budget Office (2013a) "S. 744, Border Security, Economic Opportunity, and Immigration Modernization Act," https://www.cbo.gov/publication/44225.

Congressional Budget Office (2013b) "The Economic Impact of S. 744, the Border Security, Economic Opportunity, and Immigration Modernization Act," https://www.cbo.gov/publication/44346.

Congressional Budget Office (2014) "H.R. 2131, Supplying Knowledge-based Immigrants and Lifting Levels of STEM Visas Act (SKILLS Visa Act)," https://www.cbo.gov/publication/45179.

Congressional Budget Office (2015) "How Changes in Immigration Policy Might Affect the Federal Budget," https://www.cbo.gov/publication/49868.

Congressional Budget Office (2022) "Estimated Budgetary Effects of H.R. 4521, the America COMPETES Act of 2022," https://www.cbo.gov/publication/57898.

Esche, Matthew, Jeremy Neufeld, and Heidi Williams (2024) "Estimating counterfactual population and status," https://sites.google.com/view/heidi-l-williams/writing.

The two references to Senate Amendment 1150 to S. 1348 (CBO 2007a, CBO 2007b) were added as a correction on January 22, 2024; we are grateful to Donald Marron for discussions that highlighted their unintentional omission.

---

team. We are grateful to several staff of the Congressional Budget Office and the Joint Committee on Taxation, as well as Doug Holtz-Eakin and Donald Marron, for technical feedback on this work. ↩

2. Former Acting CBO Director Donald Marron has sometimes referred to this approach as "partially dynamic," but that phrase is not commonly used. ↩

3. This policy change is also in the spirit of other recent legislative proposals such as S. 2384 (the Keep STEM Talent Act of 2023). Note that the policy we study differs from H.R. 4521, Section 80303 by including the EB-3 preference category, and it differs from S. 2384 by including the EB-1 preference category, by not requiring a job offer paying more than median wages for a given occupation and geographic area, and by not being exclusively limited to employers with an approved Labor Certification. A "foreign equivalent" to a U.S. research institution is defined as an institution undertaking $25 million in R&D spending. ↩