

# Precision in Projections: Evaluating Philadelphia's Tax Revenue Forecasts and Volatility

Consistent, reasonable revenue forecasting is a cornerstone of municipal fiscal management and a requirement of the [PICA Act](#) that the City of Philadelphia must adhere to. Effective revenue forecasts ensure that budgets align with expected resources, minimizing disruptions and the potential for unbalanced budgets. Failure to adequately forecast revenues was a significant factor in the fiscal crisis that led to the creation of PICA in the 1990s when revenue collections didn't meet projections and the City almost ran out of funds.

In 2024, [PICA examined the accuracy of the City's overall and tax revenue forecasts over the past two decades](#), finding that Philadelphia is pretty precise when it comes to making revenue predictions. On average, the City has been within +/- 4.0 percent of actual results, while the average among the 11 peer cities was +/- 5.2 percent. This means that Philadelphia was closer than average to hitting the revenue estimates on the nose. To dig further into the details, this analysis of individual tax streams draws on 21 years of financial data to examine how well projected revenues by tax type have aligned with actual collections and assesses the volatility in major tax revenue streams in the General Fund. This analysis includes the following tax types:

Tax	FY24 Actual Collections
<b>Wage &amp; Earnings<sup>1</sup></b>	\$1.8B
<b>Real Estate</b>	\$838M
<b>BIRT/BPT<sup>2</sup></b>	\$680M
<b>Sales</b>	\$300M
<b>Realty Transfer</b>	\$266M
<b>Parking<sup>3</sup></b>	\$104M
<b>Beverage</b>	\$70M
<b>Net Profits</b>	\$43M
<b>Amusement</b>	\$41M
<b>Smokeless Tobacco</b>	\$0.5M

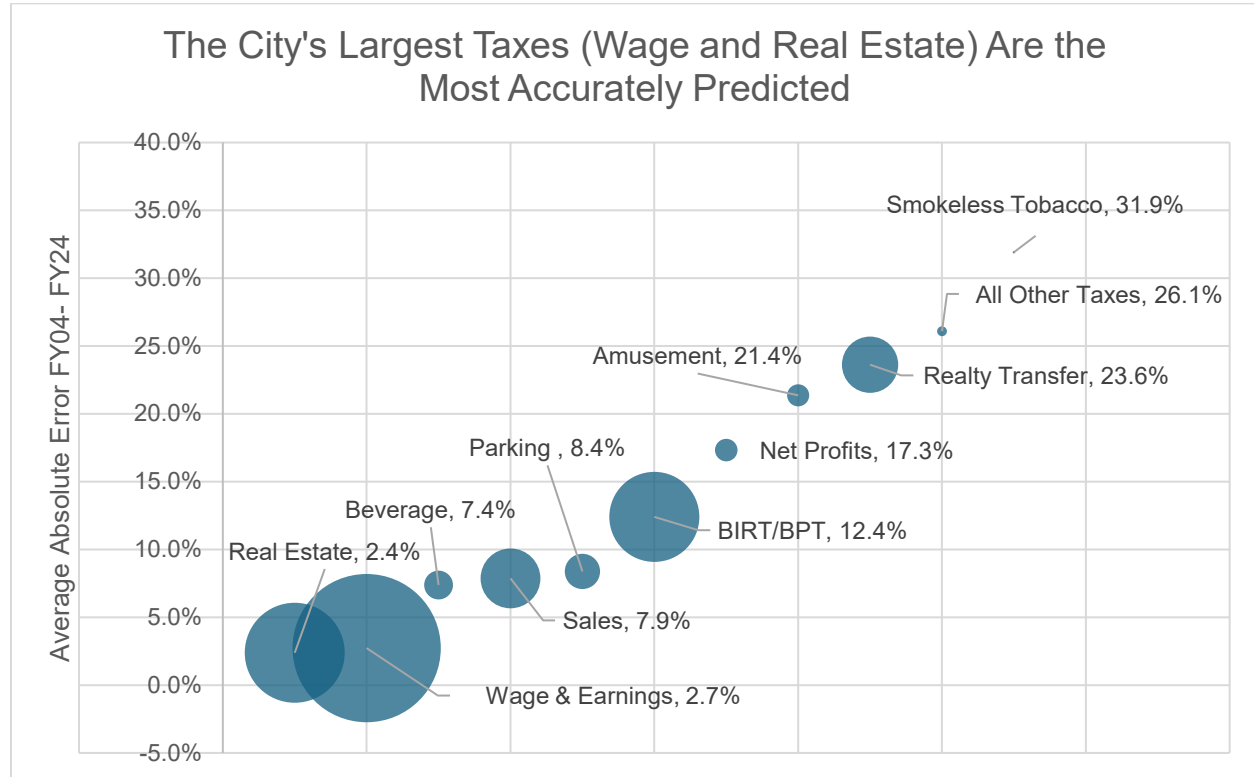
<sup>1</sup> This analysis excludes the PICA portion of the Wage and Earnings Tax which is presented in the City's financial documents as Revenue from Other Governments rather than Tax Revenues.

<sup>2</sup> This category tracks the Business Income and Receipts Tax and its predecessor, the Business Privilege Tax.

<sup>3</sup> The Parking Tax moved from the General Fund to the Transportation Fund starting in FY24.

## Key Findings

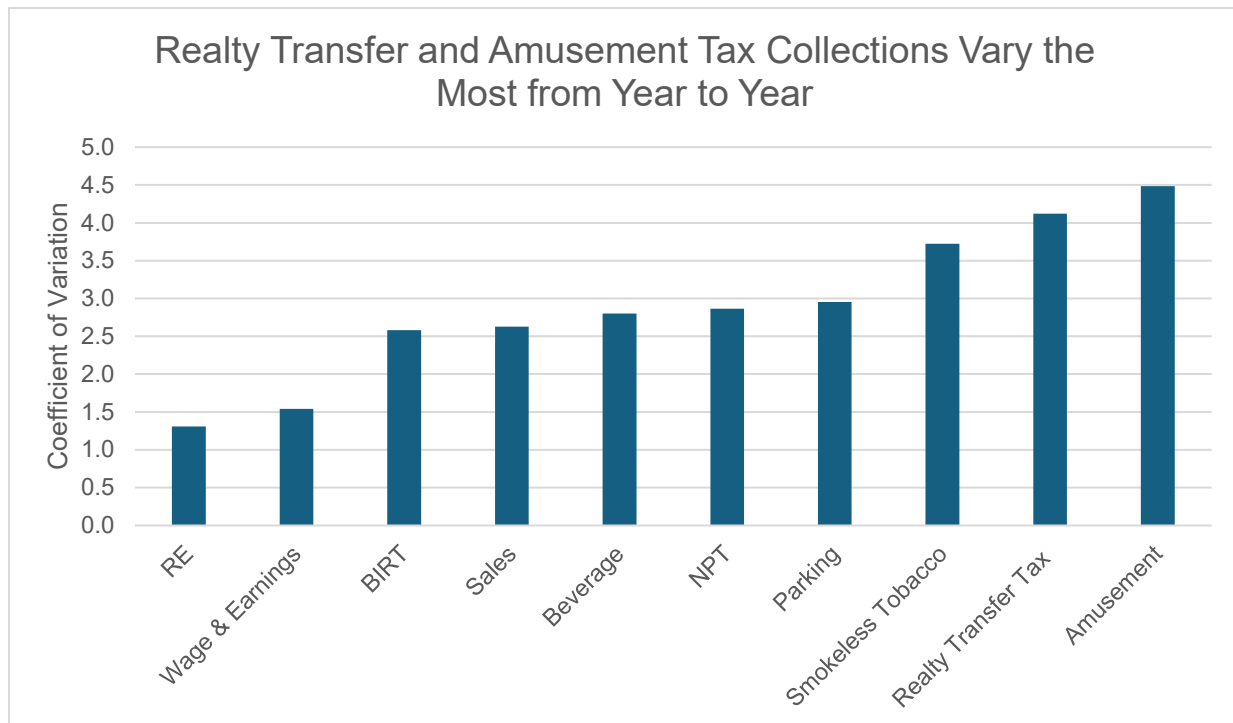
### Forecast Accuracy Varies Across Tax Types



- **The Wage and Earnings and Real Estate taxes have been the most accurately predicted.** This is particularly important as the Wage & Earnings Tax is the single largest revenue stream for the City of Philadelphia's General Fund at 30 percent (\$1.8 billion) in FY24 and the Real Estate Tax is the second largest revenue stream, \$838 million or 14 percent of the FY24 General Fund. Each of these tax types have an average absolute error under three percent between FY04 and FY24. The precision with these major revenue streams is critical; **if the Wage and Earnings Tax comes just one percent lower than projected in each year in the current FY25-29 Five Year Plan, the City's General Fund balance would be negative**, assuming no other changes to the budget.
  - Wage and Earnings Tax collections were 99 percent or less of original projections in four out of 21 years.
  - Real Estate Tax collections were 99 percent or less of original projections in nine out of 21 years.

- Philadelphia's third largest tax stream, the Business Income and Receipts Tax (BIRT) prediction precision had an absolute average error of 12.4 percent. Aside from pandemic years, the highest rate of collections over initial estimates occurred in FY06, when the tax generated roughly 30 percent more than expected. The largest rate of shortfall occurred in FY09, when just 87 percent of the expected amount was collected.
  - BIRT collections were 99 percent or less of original projections in five of the 21 years. In four of the five instances, BIRT fell short by at least five percent.
- **Philadelphia's least accurate projections have been for the Smokeless Tobacco Tax**, with an average absolute error of over 30 percent. Fortunately, even if the Smokeless Tobacco Tax failed to bring in a single dollar in each year of the current Five-Year Plan, the City would maintain positive General Fund balances. **The next least accurate projections have been for the Amusement and Realty Transfer Taxes, where the average absolute error over the past two decades has been over 20 percent.** All three taxes were particularly impacted during the pandemic, but challenges aligning original projections with actual results were consistent across the study period.
  - Philadelphia Department of Public Health staff involved with ensuring compliance with tobacco-related regulations were redeployed during the pandemic, likely contributing to lower collections than expected in those years.
  - Realty Transfer Tax collections were off by more than 10 percent in 12 out of 21 years examined. In seven of the 21 years, collections were 99 percent or less than the original projection, and less than 90 percent of original estimates in three of those years.
  - The Amusement Tax had its largest shortfall in FY21, bringing in less than one-fifth the expected amount when COVID-related closures halted most ticketed events subject to the tax. FY21 was one of nine years over the 21-year period when revenue was 99 percent or less than the original estimate.

## *Collection Volatility is Strongly Correlated with Less Precise Prediction*



- The Wage and Earnings and Real Estate Taxes have the least variation in growth rates from year to year, likely facilitating the most accurate predictions.
  - Changes in Real Estate Tax collections were below 10 percent in 18 of the 21 years, and negative growth occurred in two of the years, both during significant economic crises (FY09 of negative one percent and FY21 of negative nine percent).
  - Changes in Wage Tax collections were above 10 percent in one year, 14 percent in FY22 following a year when pandemic closures dramatically curtailed receipts from non-residents. FY21 had a nine percent decline in collections compared to the prior year.
- **The City's Amusement and Realty Transfer Tax collections experience the greatest swings from year to year.** Together they accounted for about five percent of General Fund revenues in FY24, when Realty Transfer collections were \$266 million, and Amusement Tax collections were \$41 million.
  - Between FY04 and FY24, the Amusement Tax growth rates were most volatile during the pandemic (84 percent decline in FY21 followed by 793 percent growth in FY22), but variation is consistent, for example, 25 percent growth in FY06 followed by three percent decline in FY07. A unique driver of Amusement Tax collections is the success of Philadelphia's professional sports teams. Post-season home games expand the tax base in good years.

- Commercial property sales are viewed as the more volatile component of the Realty Transfer Tax, because a small number of high-value transactions can have a material impact on overall collections. For example, a large apartment building in the city sold in FY23 for \$342 million, generating over \$11 million in Realty Transfer Tax receipts. That single transaction, out of thousands of transactions, accounted for about three percent of Realty Transfer Tax revenues for the year.

## The Takeaway

There can be many reasons for variance between original budget estimates and actual collections, including:

- Economic changes
- State and federal tax policy changes that impact local behavior
- Changes in tax administration and enforcement
- Inadequate forecasting models
- Unforeseen events (ex. pandemics, climate events)

To ensure ongoing compliance with the PICA Act requirement for balanced budgets and avoid operational disruptions that can arise from shortfalls or missed opportunities due to failure to anticipate additional revenue, the City of Philadelphia should seek to maintain and improve its tax revenue forecasting to ensure actual collections are as close to original estimates as possible while minimizing the likelihood and scale of shortfalls. This should include:

- **Regularly validate forecasting methods and models.** The City of Philadelphia should routinely examine the performance of its revenue projections and test adjustments and alternatives to see if they could have produced more accurate results. The quarterly reporting mandated by the PICA Act ensures that revenues are routinely monitored against expectations.
- **Maintain precision and conservative budgeting for the City's largest tax revenue streams, the Wage and Earnings, and Real Estate Taxes.** Any contemplated changes in the tax structure or revenue forecasting models should be devised to continue achieving collections close to original estimates and minimize the occurrences and scale of any shortfalls.
- **Consider reducing reliance on volatile, harder-to-predict taxes like the BIRT and Realty Transfer Tax.** This may mean shifting to other revenue streams or building up larger reserves to allow variances to be absorbed without needing to adjust expenditures or borrowing.

## About the Data Analysis

The analysis utilized original projections and actual collections data for the General Fund from the 20 most recent Annual Comprehensive Financial Reports (FY04-FY23) and the FY24 Annual Financial Report to obtain the original budget estimate and actual final collections for each tax type.

To assess the precision of revenue prediction, the absolute error between the original estimates and actual collections was calculated for each year and then averaged for each tax type over the twenty-year period. A lower average absolute error indicates that actual collections were closer to the prediction.

To evaluate the volatility of each tax type, first the standard deviation was calculated to measure how much the growth rate varied from the average over time. The coefficient of variation (CV) takes the standard deviation and divides it by the average growth rate, allowing comparison across tax types with very different average growth rates. A tax with a high CV means that its annual fluctuations are large compared to its average growth rate.

The correlation between the average absolute error and the CV for all tax types evaluated was .84, interpreted by the author as a strong correlation.

## Appendices

- Appendix A: Original Budget and Actual Collections by Tax Type
- Appendix B: Average Absolute Error by Tax Type
- Appendix C: Coefficient of Variation by Tax Type

## About This Report

*This report was written and edited by Marisa Waxman, with support from ChatGPT 4.0.*

## Appendix A: Original Budget & Actual Collections by Tax Type

Wage & Earnings Tax in \$000		
Fiscal Year	Original Estimate	Actual Collections
FY24	\$1,767,146	\$1,842,904
FY23	\$1,625,211	\$1,732,842
FY22	\$1,486,410	\$1,653,878
FY21	\$1,519,099	\$1,450,745
FY20	\$1,633,651	\$1,599,162
FY19	\$1,588,563	\$1,581,899
FY18	\$1,464,600	\$1,542,257
FY17	\$1,418,102	\$1,448,861
FY16	\$1,370,563	\$1,373,009
FY15	\$1,294,664	\$1,325,847
FY14	\$1,274,133	\$1,261,588
FY13	\$1,207,814	\$1,221,506
FY12	\$1,188,577	\$1,196,323
FY11	\$1,124,772	\$1,134,317
FY10	\$1,145,993	\$1,114,203
FY09	\$1,142,881	\$1,117,041
FY08	\$1,174,217	\$1,184,822
FY07	\$1,118,948	\$1,167,452
FY06	\$1,086,659	\$1,111,155
FY05	\$1,058,999	\$1,073,629
FY04	\$1,044,829	\$1,049,643

Real Estate Tax in \$000s		
Fiscal Year	Original Estimate	Actual Collections
FY24	\$845,883	\$838,092
FY23	\$813,406	\$809,568
FY22	\$723,083	\$700,636
FY21	\$684,288	\$723,321
FY20	\$690,924	\$699,050
FY19	\$669,080	\$696,603
FY18	\$651,451	\$650,436
FY17	\$594,921	\$587,099
FY16	\$581,117	\$571,647
FY15	\$547,404	\$536,449
FY14	\$536,597	\$526,424
FY13	\$514,905	\$540,531
FY12	\$486,743	\$500,721
FY11	\$497,534	\$482,725
FY10	\$420,242	\$402,187
FY09	\$411,358	\$400,057
FY08	\$399,747	\$402,789
FY07	\$409,592	\$397,543
FY06	\$394,291	\$395,817
FY05	\$384,820	\$392,681
FY04	\$364,589	\$377,668





Business Income and Receipts Tax (née BPT) in \$000		
Fiscal Year	Original Estimate	Actual Collections
FY24	\$669,709	\$679,751
FY23	\$631,530	\$673,256
FY22	\$521,199	\$749,865
FY21	\$464,321	\$541,598
FY20	\$497,317	\$534,239
FY19	\$425,192	\$540,873
FY18	\$489,886	\$446,071
FY17	\$441,568	\$417,526
FY16	\$453,874	\$474,171
FY15	\$453,193	\$438,235
FY14	\$410,005	\$461,655
FY13	\$394,920	\$450,911
FY12	\$369,320	\$389,386
FY11	\$369,162	\$376,946
FY10	\$348,688	\$364,703
FY09	\$441,514	\$385,990
FY08	\$410,180	\$398,828
FY07	\$378,927	\$436,358
FY06	\$316,167	\$415,504
FY05	\$292,210	\$379,456
FY04	\$296,312	\$309,180



Sales Tax in \$000s		
Fiscal Year	Original Estimate	Actual Collections
FY24	\$307,085	\$300,031
FY23	\$277,642	\$302,201
FY22	\$216,424	\$277,690
FY21	\$174,508	\$230,408
FY20	\$227,856	\$204,591
FY19	\$216,524	\$224,199
FY18	\$198,083	\$198,405
FY17	\$177,478	\$188,355
FY16	\$149,371	\$169,383
FY15	\$154,643	\$149,458
FY14	\$272,577	\$263,050
FY13	\$259,316	\$257,550
FY12	\$256,450	\$253,523
FY11	\$241,892	\$244,585
FY10	\$234,660	\$207,113
FY09	\$139,283	\$128,233
FY08	\$138,375	\$137,275
FY07	\$129,023	\$132,572
FY06	\$114,800	\$127,817
FY05	\$108,000	\$119,880
FY04	\$113,570	\$107,969



Realty Transfer Tax in \$000s		
Fiscal Year	Original Estimate	Actual Collections
FY24	\$388,930	\$265,587
FY23	\$418,307	\$378,782
FY22	\$294,859	\$536,894
FY21	\$292,916	\$303,989
FY20	\$339,271	\$319,794
FY19	\$310,498	\$328,446
FY18	\$242,921	\$331,517
FY17	\$249,608	\$247,290
FY16	\$221,850	\$237,347
FY15	\$176,600	\$203,370
FY14	\$157,630	\$168,068
FY13	\$124,541	\$147,968
FY12	\$120,852	\$119,364
FY11	\$125,220	\$116,644
FY10	\$84,745	\$119,236
FY09	\$186,850	\$115,133
FY08	\$205,000	\$184,048
FY07	\$195,000	\$217,329
FY06	\$147,500	\$236,430
FY05	\$127,000	\$192,266
FY04	\$93,000	\$141,345



Parking Tax in \$000s		
Fiscal Year	Original Estimate	Actual Collections
FY24	\$104,647	\$104,275
FY23	\$93,140	\$101,941
FY22	\$56,429	\$86,621
FY21	\$76,719	\$53,212
FY20	\$100,192	\$77,266
FY19	\$100,673	\$99,312
FY18	\$103,706	\$96,473
FY17	\$95,128	\$96,105
FY16	\$88,636	\$92,665
FY15	\$76,866	\$79,706
FY14	\$74,991	\$75,152
FY13	\$75,138	\$73,261
FY12	\$74,305	\$70,930
FY11	\$72,493	\$71,596
FY10	\$70,725	\$70,453
FY09	\$69,300	\$70,380
FY08	\$50,828	\$55,459
FY07	\$48,380	\$50,310
FY06	\$47,300	\$48,378
FY05	\$40,705	\$45,034
FY04	\$40,385	\$42,455

Beverage Tax in \$000s		
Fiscal Year	Original Estimate	Actual Collections
FY24	\$73,501	\$69,576
FY23	\$77,894	\$73,444
FY22	\$72,515	\$75,367
FY21	\$67,441	\$70,155
FY20	\$75,881	\$69,921
FY19	\$78,038	\$76,855
FY18	\$92,412	\$77,421
FY17	\$46,183	\$39,525

Net Profits Tax in \$000s		
Fiscal Year	Original Estimate	Actual Collections
FY24	\$47,040	\$42,567
FY23	\$36,426	\$38,990
FY22	\$30,358	\$27,286
FY21	\$29,864	\$44,374
FY20	\$38,244	\$29,206
FY19	\$31,170	\$35,808
FY18	\$29,738	\$32,297
FY17	\$24,501	\$22,323
FY16	\$18,493	\$25,389
FY15	\$20,491	\$21,156
FY14	\$12,761	\$16,262
FY13	\$12,291	\$19,164
FY12	\$17,468	\$15,121
FY11	\$12,667	\$8,826
FY10	\$12,381	\$14,506
FY09	\$13,685	\$12,199
FY08	\$14,887	\$12,502
FY07	\$14,815	\$15,262
FY06	\$13,711	\$14,621
FY05	\$12,966	\$13,720
FY04	\$13,698	\$12,956



Amusement Tax in \$000s		
Fiscal Year	Original Estimate	Actual Collections
FY24	\$33,404	\$40,800
FY23	\$22,701	\$36,144
FY22	\$12,963	\$26,055
FY21	\$16,611	\$2,918
FY20	\$28,919	\$18,446
FY19	\$22,213	\$26,406
FY18	\$22,148	\$22,970
FY17	\$20,543	\$20,577
FY16	\$19,174	\$19,397
FY15	\$20,874	\$19,005
FY14	\$20,465	\$19,974
FY13	\$22,064	\$19,081
FY12	\$21,631	\$21,911
FY11	\$21,103	\$20,767
FY10	\$18,894	\$21,850
FY09	\$17,287	\$21,379
FY08	\$17,829	\$17,984
FY07	\$17,425	\$16,454
FY06	\$19,000	\$16,970
FY05	\$17,000	\$13,562
FY04	\$15,353	\$18,312



Smokeless Tobacco Tax in \$000s		
Fiscal Year	Original Estimate	Actual Collections
FY24	\$1,112	\$508
FY23	\$1,175	\$574
FY22	\$1,066	\$737
FY21	\$967	\$522
FY20	\$986	\$1,056
FY19	\$783	\$957
FY18	\$779	\$976
FY17	\$757	\$880
FY16	\$640	\$771
FY15	\$637	\$749
FY14	\$634	\$698
FY13	\$631	\$728
FY12	\$1,000	\$628
FY11	\$4,000	\$286

## Appendix B: Absolute Average Error by Tax Type (FY04-FY24)

<b>Tax Type</b>	<b>Average Absolute Error</b>
<b>Real Estate</b>	2.4%
<b>Wage &amp; Earnings</b>	2.7%
<b>Beverage</b>	7.4%
<b>Sales</b>	7.9%
<b>Parking</b>	8.4%
<b>BIRT/BPT</b>	12.4%
<b>Net Profits</b>	17.3%
<b>Amusement</b>	21.4%
<b>Realty Transfer</b>	23.6%
<b>Smokeless Tobacco</b>	31.9%

## Appendix C: Coefficient of Variation by Tax Type (FY04-FY24)

<b>Tax Type</b>	<b>Coefficient of Variation</b>
<b>Real Estate</b>	1.3
<b>Wage &amp; Earnings</b>	1.5
<b>BIRT/BPT</b>	2.6
<b>Sales</b>	2.6
<b>Beverage</b>	2.8
<b>Net Profits</b>	2.9
<b>Parking</b>	3.0
<b>Smokeless Tobacco</b>	3.7
<b>Realty Transfer</b>	4.1
<b>Amusement</b>	4.5