Modeling Revenues

The Arlington Model—described in a separate white paper—is very useful for both understanding and forecasting county revenues. Using the full model, we can use information about the county to help us forecast different components of Arlington's revenue stream.

Although there are a huge number of different types of revenue, we break down revenues into a couple of major categories and model the impacts of development and growth on each of these categories.[1] In this paper, we cover how we forecast the following categories:

- Real Estate Taxes
- Personal Property Taxes
- Business, Professional and Occupational License Tax
- Other Local Taxes and Revenues
- Federal and State Transfers
- Revenues from Schools
- Revenues from other County Funds

We describe how we use the Model to forecast revenues in each of these categories and how these categories respond to changes in development. We make many assumptions as to how these categories behave, in each section, we describe our assumptions. For the most important assumptions, we offer people the ability to change the assumptions on the website so that way they can see how these assumptions change the forecasts. Parts of the revenue forecasts are still under constructions, either awaiting better data for more accurate forecasts or additional research to more accurately model revenue projections. A broad summary of the revenue model is presented in Table 1.

[1] Revenue data is generally sourced from the open data portal, however, more recent data is pulled directly from the budget documents themselves.

Table 1: Revenue Model by Category of Revenue

Category	Baseline Change	Development Effects
Real Estate	n/a	Explicitly modeled on a property-by-property level
Personal Property	2.0% (business), 1.0% (vehicle)	Vehicle grows with apartments (and condos), business grows with business space
BPOL	2.0%	Grows with business space
Other Local	various	Fines and transient occupancy tax are flat; others grow with hotel growth, population, growth, etc.
State and Federal	2.0%	None
Schools	2.0%	Varies significantly by category
Other County	2.0%	None
Prior Year Revs.	-5.0%	None

Real Estate Taxes

Very roughly, half of the county's revenue comes from real estate taxes.[2] The revenue raised is, quite simply, the assessment times the tax rate (minus any exemptions). We assume that the tax rate is constant over the next ten years and is set to its current level. Adjusting the tax rate on the website will update the projected values of the real estate taxes.

The second important component for determining the real estate taxes is the total assessed value of the properties being taxed. We break the assessed value into two components: existing properties and new properties. In the white paper on the Arlington Model, we discuss how we evaluate the new properties. In short, we look at "comps" of the same type of property within a nearby geographical area.

Existing properties grow at rates we estimate from the data in the Arlington Model. We examine different properties over the last five years (2015-2019). These estimates are only drawn from properties that were not redeveloped over that time, and we show these estimates in Table 2.[3]

In the post-WWII era through 2000, real estate prices for houses typically appreciated with or slightly above the rate of inflation. Arlington's average assessment increases from 2015-2019 are roughly in line or slightly higher than inflation for most residential categories, and significantly above inflation for business categories. With the recent Amazon price announcement, real estate prices have increased significantly in certain segments of the market. Already, Arlington has seen larger increases in areas such as Crystal City and Aurora Highlands. Therefore, overall assessment growth for existing properties is projected to exceed inflation for several years across most categories of property. We begin assessments at rates exceeding their historical averages. Certain categories—hotels, offices, and commercial—have a 2015-2019 change that is substantially higher than a long-run inflation rate. Therefore, we taper their rates of assessment growth to rates a bit higher than inflation, but lower than their recent historical averages. We update these forecasts as new data becomes available each January.

[2] Real estate taxes are approximately half of the county revenue, including revenue that goes directly to the schools.

[3] The estimates we have may differ from others' estimates of assessment growth by property type. This is likely because we exclude new properties from this analysis.

Table 2: Average Assessment Growth Excluding New Development

Type	Avg 2015-2019 Change	Forecast
SFH	2.5 percent	Starts at 3.5%, tapers to 2.0%
Condo	1.5 percent	Starts at 2.5%, tapers to 2.0%
Townhomes	2.1 percent	Starts at 2.5%, tapers to 2.0%
Duplex	1.3 percent	Starts at 3.0%, tapers to 2.0%
Hotel	5.0 percent	Starts at 4.5%, tapers to 3.0%
Office*	5.5 percent	Starts at 4.5%, tapers to 3.5%
Apt – Market	2.9 percent	Starts at 3.5%, tapers to 2.0%
Apt – CAF	2.9 percent	2%
Commercial	4.6 percent	Starts at 4.0%, tapers to 3.0%

* The 2015-2019 change includes effects from changes in vacancy rates. The forecast excludes vacancy rate changes. We project that vacancy rates will decrease by about 4 percent over the next 10 years, which leads to slightly higher growth in office assessments for existing properties.

Using these forecasts and combining them with the Arlington Analytics model of detached house redevelopment, as well as county development reports, we can forecast total revenues from real estate taxes.

Forecasting growth rates for assessment growth involves a large amount of judgment; on the website, we offer the opportunity to adjust these forecasts as well as the tax rate. Adjusting these two variables will allow users the opportunity to see how much assessment growth matters and what tax rate will be necessary to meet future spending needs.

To determine the total revenue, we combine these projections along with rough estimates for the value of new property. When new properties are built, they typically have a higher assessment than existing properties of the same type. Therefore, we need to develop a method for valuing these new properties. We break down each type of new property into one of eight categories: detached single-family house (SFH), condominium, townhome, hotel, office, market rate apartment, committed affordable (CAF) rate apartment, and commercial space. For townhomes, condos, and detached single-family homes, the entire property is valued at once. Hotels and apartments are valued by taking an estimate of the average assessment per unit and multiplying that by the number of units. Commercial and office space is valued per square foot of new space. The values of these new builds are summarized in Table 1.

Table 1: New Development Assessment Values

Type	Measure	Percentile
SFH	$ (separate estimates for 2-, 3, 4, 5+ bedrooms)	90%
Condo	$ (separate estimates for 1-, 2, 3+; elevator, mid, garden)	75%
Townhomes	$ (separate estimates for 2-, 3, 4+)	80%
Hotel	$ / room	80%
Office	$ / sq ft	75%
Apt – Market	$ / unit	95%
Apt – CAF	$ / unit	71% of market
Commercial	$ / sq ft	80%

In order to evaluate the likely value of a new build, we build a sample of nearby "comps", or similar properties. We start assembling the properties in the same civic association, if there are not enough properties within that civic association, then we add in properties from neighboring civic associations. If there still are not enough properties within the nearby civic associations, then we extend our range to the entire county. For most residential properties, there are plenty of "comps" within the same civic association. For larger buildings such as hotels or commercial buildings, we often need to look beyond the borders of the civic association in order to have enough properties to generate a believable estimate.

In our analysis, we find that a new property is worth more than most of the "comps". We examine a number of new properties built in the last few years and compare them against their comps. A new single-family home, on average, is worth more than 90% of existing single-family home "comps" with the same number of bedrooms. A new hotel is typically worth about more than about 80 percent of comparable hotels on a per unit basis. Office space is typically worth more than 70 percent of comparable nearby office space.

The value of new properties combined with the changes in the value of existing properties is used to compute the tax base. The rate is applied to the base to get estimates of the revenue raised from the real estate tax.

Personal Property Taxes

The personal property tax is a tax levied on both personal vehicles and on businesses' tangible property such as machines, computers, and tools. In the 2020 adopted budget, the personal property tax is estimated to bring in just under $120 million. The business side of the tax levies about one-third of that amount—roughly $40 million. The tax on personal vehicles represents the remaining $80 million.

The business component of the personal property tax has been growing slowly. In 2007, the business tangible property tax brought in approximately $26 million, in 2020, that number is very close to $40 million, which is an annual growth rate of a little less than three percent. This number is consistent with the overall change from 1992 of about 3.1 percent in personal property assessments pulled from historical CAFRs. This number is approximately close to the growth rate of office and commercial space plus inflation. Therefore, we forecast the growth in the business component of the personal property tax as two percent plus the growth rate in square footage of office and commercial space. Additional changes in office and commercial space affect this tax proportionally. For example, any new office building that increases office and commercial space by one percent will increase revenues in this category by one percent.

Personal property taxes levied on vehicles have gone from about $62 million in 2007 to $80 million in 2000, which is an increase of about 2.0 percent. Therefore, we assume that personal property tax increases at about 2.0 percent per year, which is a combination of both vehicles from new residences and the increased value on the existing fleet of vehicles (which goes up as people replace old cars with new cars). Based on the Residential Parking Working group report recommending space requirements for new buildings[4], we assume that each new apartment and condominium generates about one new car per unit at an average tax levy of about $500, consistent with the recent averages listed in the 2020 adopted budget.[5]

BPOL Taxes

BPOL taxes, or business, professional and occupation license, are a significant source of revenue. Arlington county forecasts that the BPOL tax will raise about $64 million in 2020 after rebates and adjustments. The series is highly variable over time. In 1994, the BPOL raised about $34 million, which means that the average annual growth rate is about 2.5 percent. Nonetheless, since 2006, the growth rate has been closer to 1.5 percent; some of which reflects a slowdown in the commercial real estate market in Arlington County.

There is considerable uncertainty around the BPOL revenue projections and how much of this new business tax will be levied on large corporations such as Amazon. Nonetheless, based on future business projections, we estimate that the BPOL on existing business (office and commercial) properties will increase in line with inflation at about 2.0 percent per year, and that new properties will generate revenue in proportion to the new office and commercial space that becomes available.

Other Local Taxes and Revenues

A number of local taxes, fees, fines, and other sources of revenues comprise this group.

- Sales tax
- Transient occupancy tax
- Meals tax
- Car rental tax
- Other excise and capital taxes
- Utility tax
- Licenses, permits, and fees
- Charges for services
- Fines, interest, and rents
- Prior year contributions

Although there is a lot of variation among these groups, we assume that most of these categories grow approximately with population growth and inflation combined. We apply this method to the sales tax; the meals tax; licenses, permits, and fees; charges for services; and other excise and capital taxes.

[4] Their recommendations are parking space allocations by zoning type, and their guidelines sometimes vary by number of units and other variables. We use their table as a rough guide for formulating how many cars are generated by new units, using 1.0 because it appears to be the most common option.

[5] Although the new car is taxed at $500, the car owner receives a subsidy which makes the actual tax liability less than $500. Nonetheless, the subsidy is paid out of a block grant from the commonwealth which is a fixed amount. Therefore, the total new $500 will be paid in its entirety, just not necessarily by the person who registers the car.

The transient occupancy tax is held fixed by agreement at its current levels for the next 15 years.

About one-third of the utility tax comes from residences and about two-thirds of the utility tax comes from businesses. For businesses, the tax is a rate applied to the consumption of gas and electricity. For consumers, it is also a rate, but it is capped at $3 per month per consumer per utility. Therefore, the growth rate on the utility tax is two-thirds the growth rate in commercial and office square footage and one-third the growth rate in number of residences.

The car rental tax is a tax on the cost of car rentals. We have this grow at inflation plus the average of countywide growth rate in hotel units and the countywide growth apartments.

We hold fines, interest, and rents fixed at their current levels. Fines have been declining over time and interest has been climbing. Fines will likely stop declining at some point, however, interest will likely stop increasing as declining interest rates slowly apply to a greater and greater share of the county's financial assets.

Federal and State Transfers

According to the Arlington Comprehensive Annual Financial Report (CAFR), intergovernmental section, funding increases by about two percent per year from 1992.[6] From 2004, state funding has increased by about 1.9 percent and federal funding has increased by about 2.4 percent.[7]

There are numerous categories of aid, including aid for police, highways, social services, detention services, health services, and more. The funding formulas across these categories varies considerably. In most cases, the variables generated by the Arlington Model do not predict funding across these categories. Much of the funding is determined by state administrative and legislative decisions, state tax collections, crime and poverty rates, and the federal appropriations process. County population is one determinant in a few of the categories, particularly relating to social services and policy services.

Based on these descriptions, we assume that combined commonwealth and federal transfers increases by about two percent per year. We compute that the average aid when population is in the formula, and we find that each additional resident likely generates less than $20 in additional federal aid.[8] As that is a tiny number, we exclude additional development from impacting federal aid.

Schools

Schools derive a significant amount of revenue from commonwealth and federal sources as well as a user-fees. Most of the commonwealth funding comes from two sources, Arlington's share of commonwealth sales taxes and a Standards of Quality appropriation that is determined by formula.

Arlington's share of commonwealth sales taxes is apportioned according to school enrollment. Statewide sales tax receipts have been growing at a robust pace over the last few years, considerably exceeding inflation, which has lead to a larger pool of available money for schools. In addition, growing school enrollment entitles the

[6] The definition of intergovernmental transfers in the CAFR does not appear to be identical to the one in the revenue summary from the Arlington budget.

[7] We exclude other transfers such as the state-provided WMATA subsidy from this measure, as it is generally not included as a line in the official revenue summary.

[8] Law enforcement aid is about $6.8 million dollars, and social services aid is about $4.4 million in the 2020 adopted budget. Together, these categories represent about $11.2 million dollars. Only part of this money is determined by population, which is about 240,000.

district to a larger share, which is offset by growth in student enrollment in the rest of Virginia as well. The net effect is that we assume that we assume the pool will grow at a rate only slightly exceeding inflation, but will increase proportionally to projected school enrollment.

The Standards of Quality appropriation is harder to discern. This is a formula based on need, however, much of the appropriation is directed by a locality's ability to pay. It seems like it will not be any easier to come by this money in the future if we use that measure, even if the needs determining the appropriation increase. Therefore, we increase this value at about 2.0 percent per year going forward.

Federal sources of funding have not been keeping pace with inflation and enrollment growth; since 2012, they have been increasing at a rate of a little under two percent per year. We extend that rate going forward with no modification. The variance on federal funds is higher; many of the funds are appropriated in large chunks which may or may not materialize.

The final major source of funds are from user fees. A large share of user fees come from extended day and school lunches. We grow these revenues by inflation. In addition, these user fees are scaled by ability to pay. Although there are certainly residents of committed affordable housing units who have the ability to pay, and there are almost certainly residents of market rate units who may qualify for reduced prices, for simplicity, we assume that revenues grow with student enrollment generated by market rate housing.

Funds

The three largest funds are the utilities fund, the PAYG fund, and the transportation fund.[9] These three funds as well as a number of smaller, ancillary funds, are conceptually distinct from the operating budget. Therefore, we do not model the revenues for the individual funds along with the operating budget.

Prior-year

Typically, revenues exceed projections, this money appears to be strongly correlated with assessment growth. The higher the assessment growth, the more revenues exceed expectations, and the more money is left over at the end of the budget year. This money can be spent on immediate, unanticipated needs, spent on other projects, or held over until the next budget cycle. As assessment growth changes slowly, we anticipate that prior-year funds—-assuming most of them are not spent on other projects and that unanticipated, immediate needs do not vary wildly—-will decline slowly at about 5.0 percent per year.

Notes and Acknowledgments

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For additional tools, data, and analysis, please visit our site at https://www.arlington-analytics.com/.

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[9] We increase the revenue from the other funds by about one percent per year, which is roughly in line with total growth over the last few years. There's a lot of year-to-year variation in the funds, which we choose not to model.

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