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DROP BY DROP

Water Costs and Conservation in Utah

THE PAYING FOR WATER SERIES
PART II - SEPTEMBER 2019

DROP BY DROP

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INTRODUCTION

Utah ranks among both the driest and fastest-growing states in the nation.[1] It is therefore essential that Utah's water is well managed to ensure the sufficiency of affordable quality water into the future.[2] Conservation efforts play a core role.

Utah water providers are involved in a variety of conservation efforts. Some water providers offer rebates on purchases that reduce the amount of water used, such as low-flow toilets or smart sprinkler timers. Water providers also offer educational materials and opportunities to homeowners and others on what they can do to conserve water. For instance, the Weber Basin, Jordan Valley and Central Utah water conservancy districts all have extensive conservation gardens that demonstrate low-water-use landscaping options. Some water providers also offer grants to fund water conservation projects, like converting lawns to landscapes that require lower water use.

Conservation is also linked to how much water costs – and how water users pay those costs.

Utah Foundation's series of water reports explores how Utahns pay for water. The first installment in the series provided background on the issue of water and water finance in Utah. Historically, property taxes, impact fees and water rates have played a strong role in funding the development and delivery of water. But there is debate over the extent to which property taxes should play a role in Utah's funding model.

This report examines the differing viewpoints in the context of conservation. It first outlines how water pricing can encourage conservation. It details the current effects of rates on water use. It then explores conservation in terms of fixed fees and variable rates. Lastly, the report examines incentives for water providers to encourage conservation.

WATER PRICING AND CONSERVATION

Most water providers embrace the value of conservation efforts and have conservation programs in place. At the same time, conservation could be expanded if water providers were to move beyond property taxes and instead rely solely on water rates and impact fees.

By shifting to a greater reliance on water rates, most residential customers (who use 70% of the water in public community systems) would end up with higher water bills.[3] While their property taxes would decrease, their water bills would increase, providing a stronger linkage between use and cost.

KEY FINDINGS OF THIS REPORT

- Conservation from an increase in water rates might be limited in the short term, but it would increase over the longer term.
- Comparing Utah's water providers shows that, on average, providers with 10% higher rates have 6.5% lower water use.
- A greater dependence on use-based water rates would generally tend to raise those rates and encourage conservation; however, there is currently no clear indication that water providers that depend upon a higher share of property tax revenues have customers with higher water use.
- Some water providers encouraging conservation could find themselves in a position where water use drops so much that they cannot continue to cover costs without raising rates.
- Policymakers could decouple revenues from the quantity of water sold, so conservation does not negatively affect water providers' budgets.
- Generally speaking, conservation is the cheapest way to meet demand for water, followed by agricultural conversion. Building new infrastructure is far more expensive.

It is a well-established economic principle that the more an individual pays for a product, the less that individual will tend to use.[4] Any decrease in use for each price increase depends on several factors. One factor is the availability of a substitute product. For example, if the price of apples increases, people would eat more oranges and bananas. Water, on the other hand, is a unique good and has no readily available substitute. Another factor is that water use is linked to activities that are strongly defined by habit – such as watering the yard for a certain amount of time each day or filling the tub when taking baths. Local ordinances regarding required green space could also drive water use. These factors might initially limit the amount of water conserved.

However, in the long term, use becomes more flexible. One excellent example is the price of oil. Oil was often used to heat people's homes (especially in the northeast United States). When global events led to steep oil price increases in 1973, there were not necessarily significant changes to behavior in the short term. While thermostats were adjusted, individuals could not readily find a new method of heating their homes. But over the long term, homes were built with better insulation, reducing the amount of oil needed to heat homes.[5] Homes were also built to use other heating sources, such as natural gas or electricity. In addition to home heating, oil is also the primary source for gasoline. When prices rapidly increased in the early 1970s, fewer car owners perhaps took summer trips, but people still had to commute the same distance every day, which limited the effect of price increases. However, over the long term, people changed commuting habits, and more fuel-efficient cars were developed.[6] In both cases, even though there was little that could be done over the short term, the long-term reduction was large.[7]

If water prices increase, homeowners in the short term might water their yards a little less or water their yards at night when less water is lost to evaporation. They also might make slight changes in household habits, such as shorter showers or not letting water constantly run while washing dishes or brushing teeth. Ultimately, there might be little change over the short run.

Over the long term, the installation of water-efficient showerheads, toilets, faucets, washing machines and dishwashers would become more attractive options when it comes time to replace existing fixtures and appliances. Individuals would tend to reduce the frequency of overwatering their lawns as they experiment with different watering cycles that would lower their water bills. More water efficient landscapes would be created to replace water-thirsty lawns. Higher water prices could also put pressure on local officials to permit or even encourage more water-efficient landscaping and encourage buyers in the housing market to prioritize locations with water-efficient landscapes.

Further, individual habits of water use would change as people learned ways to lower their water bills. While use might not change immediately, average use would decrease over the longer term in significant ways.

Conservation would be limited with regard to non-metered water, which by definition cannot be charged at volumetric rates. Because this water is charged at a flat rate regardless of how much is used, increasing the rate would not inspire conservation. In fact, it might negatively affect conservation by encouraging water users to "get their money's worth." For the most part, non-metered water is unimportant in the debate over taxes and water rates because both the water providers that rely on tax revenues and those that do not might offer unmetered service. Changing revenue sources would theoretically make little difference regarding unmetered use. In either case, it is a fixed fee that does not change based on the amount of water used. Shifting to a metered approach in those cases would introduce a significant new dynamic, as seen in the Weber Basin Water Conservancy District.[8]

While higher prices and more steeply tiered rates would reduce water use, it may not be necessary to limit the ability of water providers to use property taxes to generate this effect. Water providers could adjust the rate structure, using higher marginal rates among high-volume users to encourage lower use without changing the share of their budgets obtained through property taxes. Shifting the share of revenue generated through property taxes to water rates while adjusting the rate structure to impose higher marginal rates for high-volume users could further leverage rate structural changes' impact on conservation.

THE ROLE OF WATER PROVIDERS CONCERNING CONSERVATION

Water providers take different approaches to conservation. Some water providers may see encouraging conservation as a top priority. For others, the primary goal of a water provider is to offer the amount of water its users desire instead of dictating how much each user should receive. To some, tiered rates designed to encourage conservation can seem coercive. Taken to extremes, conservation-oriented tiers could work as a bludgeon to enforce limits defined by water providers. But, by comparison, conservation tiers tend to be less coercive than the actions municipalities tend to enforce during drought conditions, such as limiting the time of day outdoor watering is allowed or the amount of water available.

Can Water Providers Institute Conservation Pricing?

Utah state law requires retail water providers to institute increasing tiered pricing for culinary water.[9] It also provides that water rate structures designed to encourage the more efficient use of water can be included in water providers' required water conservation plans.[10]

Companies control the number of products they manufacture to carefully meet demand. Water providers, on the other hand, often develop water in blocks. Once current resources are exhausted, water developers might choose to secure new sources of water, which does not just meet the immediate demand for water, but can far exceed it. Usually, the new water source is more expensive to develop than previous sources. This trend in water development matches increasing tiered rates. Lower tiers are easier to procure and thus have cheaper rates. This reflects the portion water providers can easily access. Higher tiers represent increasingly harder water to obtain and distribute. However, if a water provider designs rates to promote conservation that go beyond the cost of obtaining that water, it may be subject to legal challenges. For instance, certain water providers in California instituted conservation-oriented pricing, but courts later determined that state law required them to redesign their pricing so that it was better reflective of the costs of obtaining the water.[11]

Whatever rate structure a water provider settles on, they must be able to justify the rates charged in order to prevent legal challenges. This may discourage water providers from imposing steeply tiered rate structures. However, the water providers' estimate of the cost of water may be low if water is purchased from a wholesaler that collects property taxes. When a wholesaler collects property taxes, it is able to sell water at a lower price. Retailers then set their price based on the lower price at which they obtain water. Reducing reliance on property taxes would increase the price of water for retailers, which would then be able to better justify higher retail rates that better encourage conservation.

Links Between Water Rates and Use

Utah Foundation's analysis of 107 retail water providers indicates a strong relationship between the water rate structure and the residential potable gallons used per day per capita. Among retail providers, a 10% increase in the water rate correlated with a reduction

THE CORRELATION BETWEEN HIGHER RATES AND LOWER WATER USE

It should be noted that water providers with 10% higher combined base and tiered rates and 6.5% lower water use is a correlation, but the reason why that correlation exists is not clear. While it is likely that higher prices encourage conservation, it may also be true that a water provider that sells less water per capita might lack the critical mass of customers needed to keep prices low, or a water provider had to increase rates because of voluntary conservation measures (discussed later in this report).

Utah Foundation also found an impact from base rate increases even though economic theory indicates that it should have little impact on conservation. One explanation is higher base rates encourage individuals to pay more attention to their water bills, furthering the effort of conservation overall. Another possibility is that water providers with lower water usage have shifted a larger portion of their revenues to fixed fees to avoid the loss of revenue from lower levels of water use.

Alternatively, there might be something different about these providers (i.e., local geographical, topographical or economic conditions) that cause the water agencies to have both higher water prices and lower average use.

of 2.9% in gallons used per capita per day. This suggests that if a water provider raised its marginal water prices from $2.00 to $2.20, for example, it might expect to see its residential potable gallons used per capita per day fall from 150 to 145.5. (See the Appendix for methodology.) Base rates had a similar impact. If a water provider had a base rate 10% higher than a similar provider, then its water use would be expected to be 3.5% lower. A 10% increase across both base and tiered rates is linked to a 6.5% lower usage. This combined effect of prices falls within a typical range of estimated effects for Utah and other Western states. Other studies have estimated between a 0% to 12% reduction in water use when prices are 10% higher, with a typical estimate of 5% lower usage.[12]

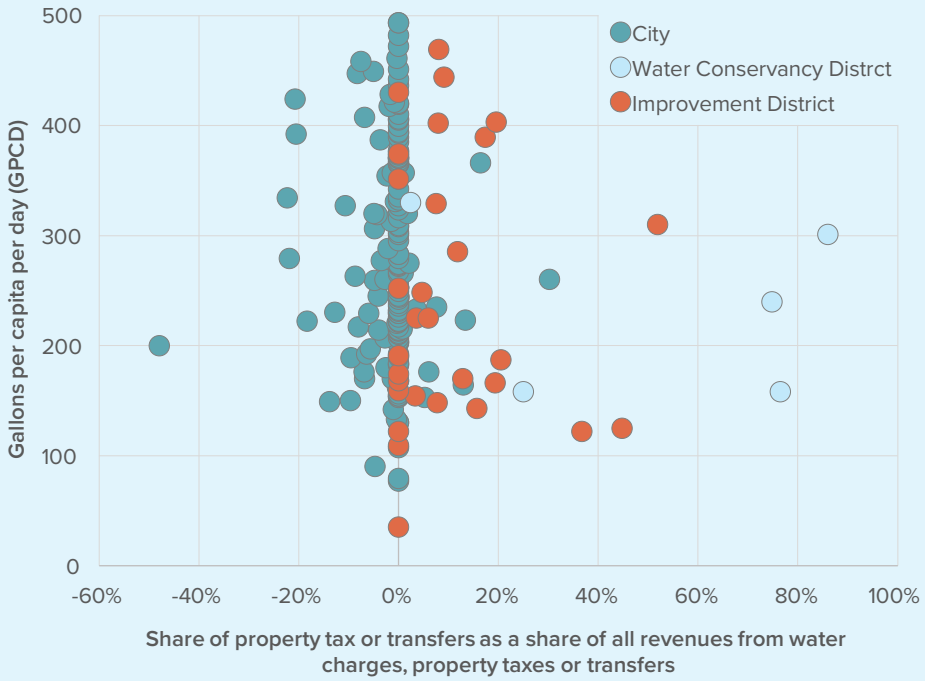
But, perhaps surprisingly, neither the makeup of a budget nor the degree to which water providers rely on taxes, rates and fees have any apparent connection to current per capita water use. The fact that water use is linked to the price of water, but not necessarily to whether a provider depends upon a stream of property tax revenue, suggests that conservation is dependent on the water rate structure charged to customers, rather than a water provider's budgetary mix. This corresponds with the idea that prices are considered a primary source of communication about the value and availability of a good. Still, water providers would be able to encourage a higher level of conservation by leveraging their budgets to depend more heavily on water rates and developing a structure that charges high-volume users substantially higher prices.

Fixed Fees and Variable Rates

Many utilities use a combination of fixed fees and variable rates when they charge consumers for their use. Utilities such as water, power, gas and sewer have a fixed cost for their infrastructure. This cost remains the same whether the services are used or not. As a result, utilities charge a set amount to each consumer that remains the same whether the consumer uses the service or not. In effect, they are paying for their access to the network.

When comparing water providers, there is no clear relationship between property tax revenues and water use.

Figure 1: Share of Water Provider Budget from Property Taxes by Water Use



Source: Utah Division of Water Resources and Utah State Auditor. Utah Foundation calculations.

The current debate about how much solar panel owners should pay for their use of the electrical grid revolves around this issue of fixed versus variable costs. Changes in the variable cost structure would likely result in lower use because the more a homeowner uses, the higher the utility bill. Use is not as likely to be affected if there is an increase in the fixed rates.

Property taxes represent a fixed cost. Whether the homeowner uses 50,000 or 500,000 gallons of water that year, the amount of property taxes will not change. Similarly, if water providers stopped collecting $240 annually in property taxes but instead charged a fixed fee of $20 a month, consumers would have no incentive to change their water use. Regardless of how much water is used, water users would still be charged the same amount in fixed fees. If water providers shifted from property tax revenues to fixed base rates, it would not be nearly as effective in terms of conservation as moving to quickly escalating tiered rates.

Complications from Overlapping Jurisdictions and the Wholesale-Retail Water Provider Structure

Limiting a water provider's use of revenues from property taxes is not as straightforward as it might at first seem. Many of the water providers that rely heavily on property tax revenues are wholesalers. These entities do not actually sell water to individuals, or if they do, it is a fairly limited part of their operations. Rather, they sell water to cities and local districts, which then sell the water to their customers.

This is further complicated by overlapping jurisdictions. For example, residents of West Valley City pay property taxes to the Central Utah Water Conservancy District, the Jordan Valley Water Conservancy District (both of which are wholesalers), and the Hunter-Granger Improvement District. This is because the Central Utah Water Conservancy District procures the water from the Duchesne River and the Provo River System and sends a portion of that north to the Jordan Valley Water Conservancy District. They in turn sell that water to various cities and improvement districts in the Salt Lake Valley, including the Hunter-Granger Improvement District, which serves West Valley City. Limiting the role of property taxes for each of these entities would have complicated consequences. The Central Utah Water Conservancy District has limits imposed by federal regulations as to what it can charge for its water.[13] Additionally, while the increasing tiered rates of water sold to consumers has been addressed, water sold at the wholesale level works differently.[14]

It should be noted that limiting water providers' ability to collect property taxes would not, in aggregate, make water more or less expensive. Water providers are not allowed to generate profits; the amount they generate through property taxes and water rates reflects the cost of providing the service. (There is something of an exception for cities, which can transfer funds out of their enterprise accounts subject to public meetings). While there might not be a difference in the total amount generated, there would be a large difference in who bears the burden of the aggregate cost, which will be more fully addressed in a subsequent report in this series.

Take a hypothetical example of what the situation might look like if water providers were restricted to using water rates and fees to cover operational and maintenance costs. Because each of these entities would no longer be able to use property tax revenues, each would have to increase its rates. This will have something of a compounding effect. In the case of the residents of West Valley City, Central Utah Water Conservancy District would have to raise its rates, because it could no longer collect property taxes. Jordan Valley Water Conservancy District would have to increase its rates in order to cover both the

If water providers shifted from property tax revenues to fixed base rates, it would not be nearly as effective in terms of conservation as moving to quickly escalating tiered rates.

revenues it used to collect through property taxes, and the higher rates from Central Utah Water Conservancy District. Similarly, Hunter-Granger Improvement District would have to increase its rates to compensate for both its lost property tax revenues and its higher cost to obtain water from Jordan Valley Water Conservancy District.

The degree to which switching from property tax revenues to water rates affects water conservation would depend significantly on how Hunter-Granger Improvement District chooses to implement those rate increases. It could be the case that most of those rate hikes would be part of a higher base fee. This could logically be the case, because that approach might align with the fixed costs associated with the infrastructure; but this might limit the impact on conservation. On the other hand, if increases in the rates on water use were emphasized, the structuring of the rate – such as the steepness of increases at various escalating use levels – could more strongly encourage conservation.

In short, changes in the funding mechanism would run into multiple complexities given the relationship between water wholesalers and water retailers and overlapping jurisdictions. While complexity is not necessarily a good reason to avoid a change, it is a good reason to be cautious in analysis. With multiple actors and different priorities leading to various rate structures, it is difficult to predict the consequences of switching from partial support from tax revenues to complete reliance on rates and fees. With that in mind, the general principle is, the more the cost is transferred from property taxes to tiered, use-based rates, the more water will be conserved.

Different Types of Water Users

As outlined in Utah Foundation's initial report in this series, different types of users pay different shares of property taxes. Owners of primary residences pay property taxes on 55% of their property's value. Commercial users pay property taxes on 100% of their property's value as well as taxes on their personal property. Generally speaking, institutional users (like governments, universities, churches and various other nonprofits) pay no property taxes.[15]

Moving from a structure supported by property taxes to a structure supported more heavily or solely by water rates would affect each of these groups differently. A more detailed analysis will be provided in part 3 of this series, which discusses fairness.

While a lot would depend on the rate structures of their specific provider, on average residential users would likely pay a net higher amount, encouraging water conservation. Residential owners with higher incomes would tend to conserve less than those with lower incomes.[16] Many commercial users could see the overall cost of their water decrease, despite higher rates. The biggest effect would be on institutional users, which often have large areas of watered green space. These entities would see the biggest change in the amount they pay for water and would have some of the strongest incentives to implement conservation measures.

One way to create the same results without limiting water providers' ability to use property taxes would be to charge differential rates for residential use, commercial use and institutional use that compensate for the amount these entities do not pay in property taxes. Just over half of Utah's water retailers already offer differential rates for commercial water users. Nearly 30% of these retailers offer a discount for commercial water users while 22% collect a premium from commercial water users. These targeted differential rates could be expanded and adjusted to encourage conservation among residential and institutional users.

INCENTIVES FOR WATER PROVIDERS TO ENCOURAGE CONSERVATION

Typically, water providers – like other utilities – lack financial incentives to encourage conservation. If consumers use less, then revenue from water rates decreases. Water providers do not generate profits, but they must cover administrative, operations and maintenance costs. As a result, if they use water rates to encourage conservation they could find themselves in a position where water use drops so much that they cannot continue to cover their costs.[17] This was the case in many water districts in the 2011-2017 California drought. As water providers raised rates to cover budget shortfalls, customers felt punished for successful conservation efforts.[18]

In other types of utilities, states are experimenting with alternative funding structures that provide financial incentives to encourage conservation. Most utilities naturally have a monopolistic structure. Usually, a public utility commission has authority over utilities to ensure that utility companies do not abuse that power. These commissions generally set a fixed price or rate structure at which the commodity can be purchased. The utility company's revenue is then based on the volume sold, with higher profits generated from selling additional units. This discourages utility companies from conserving, because conservation would eat into their revenues and possibly their profits.

An emerging alternative method is do decouple profits from the number of units sold. This is done by the public utility commission setting a fixed amount of revenue rather than a fixed price. This allows the utility to cover its costs by collecting a specific amount of revenue.[19] The utility's primary incentive at this point is to not increase profits by selling more units, but rather increasing profits by lowering the costs. One of the quickest ways of lowering costs is by selling fewer units.

Rate decoupling holds the potential of allowing public utilities to cover costs while at the same time reducing the volume of sales. While several states have implemented rate decoupling for electric and natural gas utilities, its implementation among water providers appears to be more limited, despite the recognition of its potential by the National Association of Water Companies.[20]

In order for decoupling to be successful in increasing conservation, any existing tiered rates charged to users would need to be more flexible. Rates might need to be established in ranges based on how much water is demanded. Alternatively, rates could fluctuate on a quarterly, or even monthly basis.

OTHER FACTORS IN CONSERVATION, CONVERSION AND CONSTRUCTION

While conservation, conversion and the construction of new infrastructure are generally considered increasingly expensive options in new water development, there are other factors to consider. For example, while conversion is cheaper for the water provider, water users typically bear the upfront costs. It is the users who invest in water-efficient fixtures, invest in landscapes that use less water and face the more intangible costs of changing habits.

However, investment in water conservation pays off. It reduces the amount of water consumed, which reduces the amount users will pay in their water bills over time. Because conservation reduces water used, and bills paid, it may be cheaper in the long run even if it is more expensive upfront.

On the other hand, when new infrastructure is built, users will pay higher rates to cover construction costs. But they also pay the additional costs of maintaining and operating the new infrastructure while not specifically reducing their water use and saving on their water bills.

There is a basic amount of water past which Utahns cannot conserve. At some point, additional investments in water conservation will be decreasingly effective in reducing water use. There are now examples where the cost of producing an acre-foot of water is cheaper by building new infrastructure than encouraging further conservation through landscape conversion.*

It is ultimately the end user that must bear the cost of any investment, whether in conservation, conversion or new infrastructure.

Finally, while agricultural conversion is generally cheaper than new infrastructure, public opinion can also influence decisions. In a public feedback process conducted by Envision Utah, 37% of more than 50,000 respondents indicated that they were willing to water their lawn less to avoid taking water from agriculture, while only 4% indicated they were not at all willing to do so. Along the same lines, but with less support, 17% of respondents indicated they would be very willing to spend more money investing in new infrastructure to avoid converting agricultural water, while only 8% indicated they were not at all willing. †

* The cost per acre-foot of water for various types of conservation are outlined in Hansen, Allen & Luce, Inc. and Bowen Collins & Associates, "Draft: Utah's regional M&I water conservation goals," Prepared for the Utah Division of Water Resources, (2019), https://water.utah.gov/wp-content/uploads/2019/08/Regional-Water-Conservation-Goals-Public-Review.pdf. Compare to the cost of development for the Bear River Pipeline. See Bowen Collens & Associates and HDR Engineering, "Bear River Pipeline concept report," Prepared for the Utah Division of Water Resources, (2014), https://cachecounty.org/assets/department/water/brpipeline/Vol%201_Final_Bear%20River%20Pipeline%20Concept%20Rpt.pdf.

† Envision Utah, "Survey results for agriculture," (2015), https://yourutahyourfuture.org/images/pdfs-doc/Results_Release_Agriculture_final.pdf.

Decoupling revenues would allow freedom for water providers to institute other conservation measures without diminishing financial stability. They would be free to develop more steeply tiered rates, differential water rates where prices were higher during droughts and times of scarcity, and other conservation measures. Water providers might need to take extra steps to be transparent as consumers adapt to the new billing system.

Even when there are not necessarily financial incentives, there are other factors that can encourage water providers to promote conservation among their users. Water providers are committed to providing enough water for their users. As demands grow, they can gain water from three primary sources: conservation, conversion and new source infrastructure. Conservation virtually increases the water supply as conserved water can be used by other users. Conversion increases the supply by converting non-potable sources, such as agricultural water, to residential potable water. Finally, building new infrastructure can provide access to water from a new location, whether through pipelines, tunnels or wells.

Generally speaking, conservation is the cheapest way to increase the supply of water, followed by conversion. Conversion tends to be more expensive because water may have to be distributed differently and treated at a higher standard. The cost of building new infrastructure can be quite expensive, even setting aside the sometimes-substantial costs to the environment. Because building new infrastructure and even conversion tend to be both more expensive and logistically challenging, there are pressures on water providers in their internal organizations to first encourage conservation, before resorting to the more expensive and complicated options. In the end, this can pay off for users by reducing cost pressures, and thereby pressures on the water rates that users pay.

CONCLUSION

Utah's water providers know that conservation is important to both water sustainability and minimizing investments in infrastructure expansions. For water providers that depend heavily upon property taxes, conservation efforts could be bolstered with a shift to greater reliance on water rates.

But how effectively the shift to water rates promotes conservation depends heavily upon on how water rates are structured. In fact, some of the effects of conservation that would be generated by relying on water rates could be captured without removing the property tax component, assuming that the water rate structure were well-calibrated to encourage conservation. For instance, increases in use-based rates can have a far more significant impact on conservation than increases in base water rates. Those conservation gains could be further leveraged by depending still less on property tax revenues.

In addition, there are a number of ways conservation could be increased even where property taxes make up a significant portion of a water provider's budget. Decoupling revenues from the volume of water sold, for example, removes a disincentive from water providers to encourage conservation.

However, conservation is just one aspect to address in the debate over the usefulness of property tax revenues in funding water services. Subsequent reports in this series will focus on fairness and practical considerations pertaining to property taxes and water rates.

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APPENDIX

Utah Foundation used 2017 water use data from the Division of Water Resources, 2017 water rates gathered by the Governor's Office of Management and Budget and 2014-2017 budget information gathered by Utah Foundation from water providers' financial reports posted on the Utah State Auditor's website. The four years of budget information was averaged to mitigate noise from unusual years. (For some limitations in the budget data, view Appendix B in Part I of this series.)

Utah Foundation used the ordinary least squares regression to estimate the impact of various factors on water use. Fixed effects of water basin and type of budget (enterprise accounts solely responsible for water services, enterprise accounts responsible for additional services with water data broken out, and enterprise accounts responsible for additional services without water data broken out) were also included in the model to account for differences in geographical characteristics and budget reporting. The constant and slope of the line of best fit were calculated by using the ordinary least squares method on marginal rates between 1,000 and 71,000 gallons. Few water providers increased tiers after 71,000 gallons.

Figure 2: Regression Results on Retail Water Use

Independent Variables (transformed with the natural log)	Coefficient
Operating budget	0.181
Water rate revenues as a share of operating budget	0.130
Impact fee revenues as a share of operating budget	-0.011
Property tax revenues as a share of operating budget	0.001
Base rate	-0.359***
Constant for the line of best fit	-0.293***
Slope for the line of best fit	0.037
Population	-0.417
Secondary residential GCPD	-0.099***
Population Density	-0.115***
Controlling Variables	
City, local district, or water conservancy district	
Water basin (based on DWRe classification)	
Type of budget (solely water, or combined with other services)	

*** Statistically significant with $p \leq 0.001\%$.

It should be noted that estimates of price differences on water use vary based on the type of methodology. Utah Foundation did a cross-sectional study, which looks at the variations of many different districts. Many other studies take a time-series approach which looks at the before-and-after situation of changes in a single district. Cross-sectional studies might capture differences due to topographical, or local economic factors. Time-series might not give enough time to adapt to long-term solutions.

ENDNOTES

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10 Utah State Code Sec. 73-10-32.

11 Stevens, Matt, "California water districts scramble to deal with ruling on rate tiers," *LA Times,* 7 May (2015), https://www.latimes.com/local/california/la-me-water-rates-20150507-story.html.

12 Gardner, B. Delworth "The economic effects of using property taxes in lieu of direct user fees to pay for water," in *Aquanomics: Water Markets and the Environment,* ed. B. Delworth Gardner and Randy T. Simmons, Transaction Publishers, 2012), 225-246.

13 Shawcroft, Gene, General Manager of the Utah Water Conservancy District, Personal Interview on 10 July 2017.

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15 In practice, it tends to be a little more complicated. To the degree these entities are not involved in commercial, profit-making activities, their property tax liability is reduced or removed.

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