

A Forrester Total Economic Impact™
Study Commissioned By Microsoft
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The Total Economic Impact™ Of The Modern Data Warehouse

Improved Analytics At A Lower Cost With
Microsoft Azure SQL Data Warehouse

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Project Director:
Jonathan Lipsitz

Project Contributor:
Jon Erickson

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Executive Summary

Microsoft provides Azure SQL Data Warehouse, a cloud-based enterprise data warehouse solution, that helps its customers achieve scale and better performance at a lower total cost of ownership (TCO). Microsoft commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying Azure SQL Data Warehouse (also referred to as Azure in the study) solutions. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of Azure for data warehouses on their organizations.

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed four customers with experience using Azure for SQL data warehouses.

Prior to moving their data warehouses to Azure, customers typically had a mix of on-premises and much smaller cloud deployments. However, these solutions were costly and did not deliver the performance or scale that was needed. Additionally, it was difficult to generate timely insights because the data could not easily be aggregated and accessed for analysis, and also because performance limitations meant lengthy delays.

Key Findings

Quantified benefits. The following risk-adjusted present value (PV) quantified benefits for a 3,000-employee organization are representative of those experienced by the companies interviewed:

- › **Data analytics improved and associated costs reduced as well.** Moving to Azure was not primarily about cost savings. Instead, it was about improved data warehouse performance (by utilizing more cloud-based compute power and storage than was available on-premises) and how that enabled better analytics and business intelligence for both internal and external use. Additionally, the amount of effort required on the part of internal data scientists and outside professional services organizations was reduced. For example, the number of requests made for a data scientist's time was cut in half. This and other efficiencies meant that the amount of resources, equal to five full-time equivalents (FTEs), was freed up by Year 3 of the study. Since the individual business benefits, from improved data warehouse performance and business intelligence, varied greatly across organizations only the cost savings component is included in the financial analysis. The total three-year present value (PV) savings was \$2.4 million.
- › **Infrastructure build-out and ongoing maintenance costs were reduced.** By moving to the Azure cloud, companies avoided costly capex expenditures to build out an on-premises solution approaching the capabilities they have in Azure. One interviewee estimated it to be 10x their first year spend on the Azure data warehouse. Additionally, ongoing SQL licenses were 30% lower because fewer processor cores were required. The total three-year PV savings was \$561,435.
- › **IT team productivity improved from eliminated infrastructure and database support activities.** Both database administrators (DBAs) and application developers saw improved productivity. Less effort was required in supporting the infrastructure because additional data warehouse resources were more quickly available for developers to use. The result was fewer additional hires to support growth. The total three-year PV savings was \$1.6 million.

Key Benefits



Increase in customer data sets that can be effectively handled:

10x



Reduction in SQL license costs:

30% to 50%



Improved data analytics reporting granularity:

1 day to 15 minutes



ROI
158%



Benefits PV
\$4.6 million



NPV
\$2.8 million



Payback
<6 months

Unquantified benefits. The interviewed organizations experienced the following benefits, which are not quantified for this study:

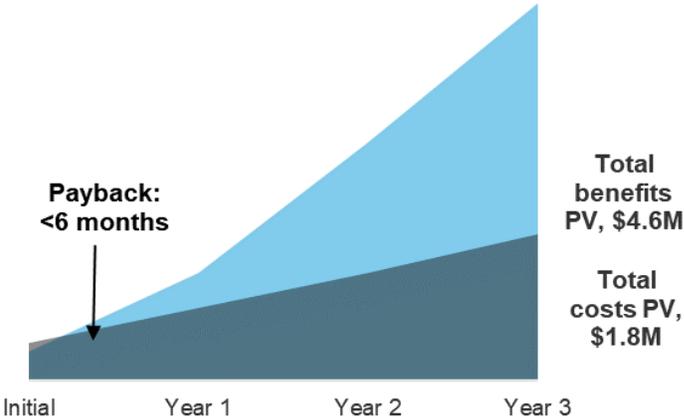
- › **Organizations improved database security by taking advantage of features with Azure.** As Microsoft began to take care of all software patching, security was able to improve in several ways. Features such as always encrypted VNET service and endpoints came to be standard, with better access control through Active Directory.
- › **Businesses saw improved results from better data performance and analytics.** Interviewees provided many examples of improved business outcomes, including: closing more deals, bringing solutions to market faster, and increasing customer satisfaction. Furthermore, data democratization has meant that individuals across the organization can get the answers they need faster, and this has freed up the centralized data scientist team to work on more strategic and long-term projects.

Costs. The interviewed organizations experienced the following risk-adjusted PV costs:

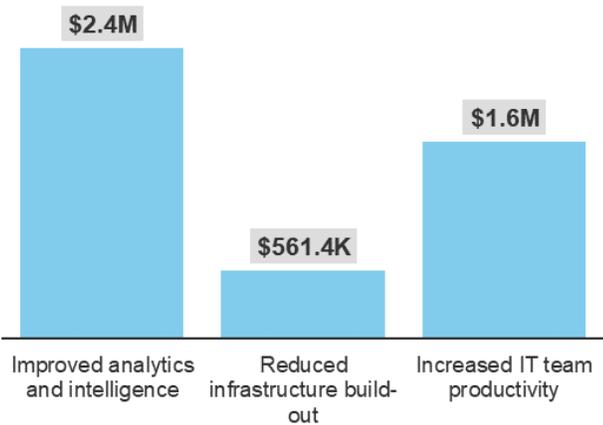
- › **The initial deployment was relatively fast and simple.** Interviewees said that moving to the Azure SQL Data Warehouse environment took a couple of resources and a few months. One interviewee estimated that an equivalent on-premises solution would cost six times more than the Azure solution to build out, in terms of hardware and effort. There were also some professional services to help configure and integrate the Azure solution. The total PV cost was \$401,500.
- › **Ongoing operation of the Azure solution was simple to manage.** Interviewees reported that it typically took no more than one FTE to manage the cloud-based environment and provide services such as spinning up new databases. There were also some ongoing professional services to help with optimization and analysis activities. The total PV cost was \$665,855.
- › **Azure fees paid to Microsoft were predictable and scalable.** This varies greatly depending on the size of the Azure deployment. Moving to an opex model made for more predictable budgeting. For the composite organization, the total PV cost over the life of the study was \$706,314.

Forrester's interviews with four existing customers and subsequent financial analysis found that an organization based on these interviewed organizations experienced PV benefits of \$4.6 million over three years versus costs of \$1.8 million, adding up to a net present value (NPV) of \$2.8 million and an ROI of 158%.

Financial Summary



Benefits (Three-Year)



The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

TEI Framework And Methodology

From the information provided in the interviews, Forrester has constructed a Total Economic Impact™ (TEI) framework for those organizations considering implementing Microsoft Azure SQL Data Warehouse (Azure solutions).

The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision. Forrester took a multistep approach to evaluate the impact that Microsoft Azure can have on an organization:



DUE DILIGENCE

Interviewed Microsoft stakeholders and Forrester analysts to gather data relative to Azure SQL Data Warehouse.



CUSTOMER INTERVIEWS

Interviewed four organizations using Azure SQL Data Warehouse to obtain data with respect to costs, benefits, and risks.



COMPOSITE ORGANIZATION

Designed a composite organization based on characteristics of the interviewed organizations.



FINANCIAL MODEL FRAMEWORK

Constructed a financial model representative of the interviews using the TEI methodology and risk-adjusted the financial model based on issues and concerns of the interviewed organizations.



CASE STUDY

Employed four fundamental elements of TEI in modeling Microsoft Azure SQL Data Warehouse's impact: benefits, costs, flexibility, and risks. Given the increasing sophistication that enterprises have regarding ROI analyses related to IT investments, Forrester's TEI methodology serves to provide a complete picture of the total economic impact of purchase decisions. Please see Appendix A for additional information on the TEI methodology.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by Microsoft and delivered by Forrester Consulting. It is not meant to be used as a competitive analysis.

Forrester makes no assumptions as to the potential ROI that other organizations will receive. Forrester strongly advises that readers use their own estimates within the framework provided in the report to determine the appropriateness of an investment in Microsoft Azure SQL Data Warehouse.

Microsoft reviewed and provided feedback to Forrester, but Forrester maintains editorial control over the study and its findings and does not accept changes to the study that contradict Forrester's findings or obscure the meaning of the study.

Microsoft provided the customer names for the interviews but did not participate in the interviews.

The Microsoft Azure Customer Journey

BEFORE AND AFTER THE AZURE SQL DATA WAREHOUSE INVESTMENT

Interviewed Organizations

For this study, Forrester conducted four interviews with Microsoft Azure SQL Data Warehouse customers. Interviewed customers include the following:

INDUSTRY	MAIN OPERATIONS AREA	INTERVIEWEE	# OF EMPLOYEES
Online media	North America	Chief technology officer	81
Industrial manufacturing	Global	Sr. database platform architect	19,000
Workforce solutions	Africa and Australia	Insight and analytics leader	4,000
Utilities consulting	North America	Sr. solutions architect	20

Key Challenges

The interviewed organizations faced many challenges around performance, cost, and usability that led to them seeking a better solution and eventually choosing Azure for their data analytics needs.

- › **Existing solutions limited the data analytics that companies could undertake.** The interviewed organizations felt that their previous, on-premises SQL database solutions hampered their ability to complete effective and timely data analytics. There were a range of underlying causes from performance and scalability issues to disparate systems that did not work well together. One interviewee said: “Our data infrastructure was haphazard and that meant we couldn’t answer questions. It would take days to pin data together.”
- › **Managing the SQL database environment was too costly and time-consuming.** The previous solutions were typically very heterogeneous, which resulted in complex management processes and costs that were too high, especially to support future growth. “It was partially about cost since it is expensive to run a SQL server,” said one interviewee. “We needed better cost and labor efficiency. We want everything to run seamlessly with as little touch as possible.” Another interviewee said: “A huge amount of time was spent on collecting data and consolidating it. Some people would spend multiple days consolidating reports.”
- › **Business operations and go-to-market strategies were hampered by performance limitations.** While cost is always a consideration in all technology decisions, the interviewed companies stressed that their biggest concern and why they moved to Azure was to better support business objectives. One interviewee described it this way: “Cost was not the main factor. We deal with a lot of big data sets, and as a small company we are always looking for ways to support our customers better. We also look for the fastest way to market with new solutions.”

“We’ve grown through acquisition, and that meant we had a disparate data architecture and no unified data model. This was inherently unstable and could not deliver what the business needed.”

Insight and analytics lead, workforce solutions



Key Results

The interviews revealed that key results from the Microsoft Azure SQL Data Warehouse investment include:

- › **SQL database and associated analytics performance improved significantly, resulting in better and faster analytics.** Interviewed organizations all described how their SQL performance and analytics improved, and how this translated into real business benefits. One interviewee said: “We do modelling for our clients based on their customers’ past usage. In the time it took us to analyze 10,000 of their customers, we can now model more than 100,000 because of Azure. Everything is streamlined and easier, and we can get our clients the information they need faster.”
- › **Costs are more predictable and balanced by moving to an opex model.** Previous capex models meant that companies could not build out cost-effective solutions to meet their peak load requirements and concentrated expenditures; this resulted in uneven cashflows. With cloud-based solutions like Azure, cashflows are more evenly spread and predictable. “The opex model is very important to my management and makes it easier when I ask for a budget. It provides better transparency, and I can scale things back down and turn them off if they don’t deliver the expected business outcomes. That makes it easier to realize our business cases.”
- › **Scale is easily achieved to support business growth.** Improved performance, streamlined management, and lower costs mean that companies can better support future growth from a business process, data analytics, and SQL database performance perspective. “Scale used to be a big problem for us. By moving to the Azure cloud, we can ramp up quicker than before and in ways that were previously cost prohibitive while using less developer time.”

“It was fortuitous that we were talking to Microsoft about something else and discussed what we could do in Azure. We knew what we wanted to do, but not how best to do it. We left our meeting with Microsoft thinking Azure was the unicorn we were looking for.”

CTO, online media



Composite Organization

Based on the interviews, Forrester constructed a TEI framework, a composite company, and an associated ROI analysis. The composite organization is representative of the four companies that Forrester interviewed and is used to present the aggregate financial analysis in the next section. The composite organization that Forrester synthesized from the customer interviews has the following characteristics:

Description of composite. The composite organization is a US-based services company with operations across North America and Europe. It has approximately 3,000 employees. Prior to consolidating in the Azure SQL Data Warehouse, it had a mix of on-premises and cloud-based database solutions. It moved to Azure to simplify operations, control costs, and achieve better database and data analytics performance.

Deployment characteristics. The organization’s Azure SQL infrastructure varies based on workload requirements. There are two data warehouse instances, and the size of each is ten terabytes. Their average monthly usage is SQL DW500 and peak usage is DW1500. The overarching goal was to build out a “modern data warehouse” to leverage platform-as-a-service (PaaS) solutions as much as possible. The composite organization also wanted to take advantage of “Microsoft’s investment in cutting-edge technology to get better performance and features.”

Financial Analysis

QUANTIFIED BENEFIT AND COST DATA AS APPLIED TO THE COMPOSITE

Total Benefits

REF.	BENEFIT	INITIAL	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Atr	Improved analytics and intelligence	\$0	\$499,500	\$1,116,000	\$1,350,000	\$2,965,500	\$2,390,680
Btr	Reduced infrastructure build-out	\$360,000	\$81,000	\$81,000	\$81,000	\$603,000	\$561,435
Ctr	Increased IT team productivity	\$0	\$468,000	\$702,000	\$819,000	\$1,989,000	\$1,620,947
	Total benefits (risk-adjusted)	\$360,000	\$1,048,500	\$1,899,000	\$2,250,000	\$5,557,500	\$4,573,062

Improved Analytics And Intelligence

The most important benefit the interviewees cited was improved and more agile analytics, which helped the organizations make better decisions faster, democratize data analysis, and improve business insights. It also helped reduce costs associated with internal and external data analysis efforts. Some of what Forrester heard included:

- > “Before Azure, a lot of our reporting was done off the live, operational system, which caused performance problems. That meant some of the extracts could only be done overnight. Now we can do data transfers directly into Azure every hour instead of every night with no impact on operational performance. We plan to reduce this to every half hour once PowerBI comes fully online.”
- > “Our data scientists wanted to run regression analysis against the data, but our previous solutions couldn’t really do that. It required a developer working with R script and Python to make it happen, and this could sometimes take a week. Now our data scientists and analysts can work in near real time [using T-SQL].”
- > “The manual effort to collect, collate, and build reports has been dramatically reduced. The total effort for 15 to 20 people across the organization who are doing operational and financial analysis has been cut in half.”
- > “Connecting seamlessly to block storage makes a big difference in what we can deliver to customers and what we can do around machine learning and AI.”
- > “We have better dashboards and didn’t have to build a central reporting system in Power BI. We have democratized access to the data and taught our analysts how to create the reports they want.”
- > “There were a lot of things we could not do before because we could not afford the hardware. Because we can scale up and down with Azure, we now do the heavy analysis we always wanted to.”
- > “Azure allows us to provide customers with more granular data that is 15 minutes old instead of more than one day old. This allows them to sell more because they can get near real-time data on how they are performing. In turn, they tell others about this which helps us win new customers.”

The table above shows the total of all benefits across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total benefits to be a PV of more than \$4.5 million.

“The biggest benefit is the analytics piece. Data scientists can get their hands on the data quicker, which helps them deliver prospective customer proof of concepts (PoCs) faster and close deals faster. It also helps them bring new solutions to market faster.”

Sr. solution architect, utilities



- › “A big savings for us was the amount of effort wasted by our data scientists trying to complete analyses with the old systems. We were able to avoid additional hires and free them up to work on more things.”
- › “We had a large outsourcing contract with a consulting company to do data analysis for us. We were able to eliminate it entirely. Between that and internal resource savings, we have saved more than [\$1.2 million] per year.”
- › “We contract some of our analysis work out to another firm. Their costs would have doubled had we not moved to Azure.”

Because the business benefits associated with better and faster data analytics vary so greatly from one firm to the next, e.g., supply chain optimization versus selling more, the financial component of this study only includes the savings from less internal and external data analytics effort. Readers are encouraged to consider the business impacts of better and more agile analytics, and factor that into their own analysis.

Specific assumptions for the financial analysis include:

- › The fully burdened cost for an internal data scientist is \$130,000.
- › One additional data scientist/analyst hire is avoided in Year 1 of the study, and the total number grew to five by Year 3 of the study.
- › An \$850,000 contract for external data analysis work was eliminated. Half of the benefit is realized in Year 1 of the study.

Because the amount of savings can vary from one organization to the next depending on the nature of the analytics they are doing, how many people are involved, and if there are external resources, Forrester adjusted this benefit downward by 10%, yielding a three-year risk-adjusted total PV of \$2.4 million.

Impact risk is the risk that the business or technology needs of the organization may not be met by the investment, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for benefit estimates.

Improved Analytics And Analysis: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
A1	Eliminated outsourcing contract	50% in Year 1	\$425,000	\$850,000	\$850,000
A2	Reduced internal resources		1.0	3.0	5.0
A3	Fully loaded cost, internal resources		\$130,000	\$130,000	\$130,000
At	Improved analytics and intelligence	$A1+A2*A3$	\$555,000	\$1,240,000	\$1,500,000
	Risk adjustment	↓10%			
Atr	Improved analytics and intelligence (risk-adjusted)		\$499,500	\$1,116,000	\$1,350,000

Reduced Infrastructure Build-Out

Moving to Microsoft’s Azure data center greatly reduces or eliminates the need to build out one’s own infrastructure (both primary and disaster recovery), either on-premises or in a colocation facility. Furthermore, interviewees said that moving to Azure reduced the amount and cost of Microsoft SQL licenses because fewer cores are required, and moving also provided better disaster recovery (DR) capabilities. Specifically, Forrester heard from interviewees:

- › “It would be impossible for us to build out the equivalent infrastructure in our own data center because we scale very large a couple of hours a day — sometimes 10 times our normal capacity. We could never justify it if we were building on-premises. It probably would cost six times our annual Azure bill just to build it out.”
- › “We went from two enterprise and two standard SQL licenses down to one enterprise license by moving everything to the cloud.”
- › “From a SQL licensing perspective, our costs are down 30%.”
- › “We are a six-year-old startup, and trying to be pragmatic about what we do from a DR perspective. We didn’t want to have to run two full data warehouses in case one went down. With Azure, we avoid doing that.”
- › “We don’t have any downtime. The nice thing is that once we made a conscious effort into putting out all the fires and having it work in a reliable way, we can focus on performance and business improvements. Now we have monitoring across all services and know early when things start to degrade, which gives us the time needed to address it. Azure made all of this much easier.”
- › “Before Azure, we didn’t have true failover protection. We had backups in order to stand the infrastructure up again. Now our data is triple redundant, and our DR capabilities are immeasurably better.”
- › “A lot of the implementation in our colocation facility was just bare metal. To get real redundancy would have taken additional virtualized hardware and a second cluster with fast failover. It would have taken us months to put all of that together and replicate the data. It probably would have cost us \$120,000.”

For the composite organization, Forrester assumes that:

- › The cost to build out a primary, on-premises data warehouse that met the basic load requirements was \$300,000, and a backup DR data warehouse would cost \$100,000.
- › Maintenance on the hardware is calculated at 15%.
- › Microsoft SQL license costs were reduced by 30%.

These costs will vary based on data warehouse requirements and the existing on-premises data warehouse infrastructure. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year risk-adjusted total PV of \$561 thousand.

Reduced Infrastructure Build-Out: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
B1	Primary data center		\$300,000			
B2	DR facility		\$100,000			
B3	Hardware maintenance	$(B1+B2)*15\%$		\$60,000	\$60,000	\$60,000
B4	Reduced SQL license costs	$\$100,000*30\%$		\$30,000	\$30,000	\$30,000
Bt	Reduced infrastructure build-out	$B1+B2+B3+B4$	\$400,000	\$90,000	\$90,000	\$90,000
	Risk adjustment	↓10%				
Btr	Reduced infrastructure build-out (risk-adjusted)		\$360,000	\$81,000	\$81,000	\$81,000

“We can scale up on demand quickly and easily. My infrastructure team says it is a fraction of the cost of what it would be to do all of this on-premises.”

Insight and analytics lead, workforce solutions



Increased IT Team Productivity

Interviewees reported that DBAs and application developers both became more productive after moving to Azure SQL Data Warehouse. For DBAs, this was primarily attributed to less time spent setting up and optimizing additional data warehouses as well as ongoing patching and maintenance activities. For developers, better performance and availability meant that they could do their work faster and better, and also the self-service capabilities, such as provisioning their own databases, meant that they did not need to wait on others to complete tasks. This translated into fewer additional hires to support growth and the ability to reassign existing people to higher value activities.

Specifically, Forrester heard from interviewees:

- › “We had one database developer and one DBA. The DBA left after 12 months because they had nothing left to administer.”
- › “We currently have three DBAs and would have needed to hire one more for dedicated IT activities around patching had we not moved to Azure.”
- › “Provisioning is a lot faster now. If you order a bare metal server and put on an operating system that would take at least one day. Now, it only takes us 10 minutes.”
- › “We have five application developers. Their lives have become much easier because they have less stuff to deal with. They are no longer writing glue or customer components. Azure has massively increased productivity. I probably would have needed to hire two or three more people to do everything that we have delivered.”
- › “We have seven application developers, and they are all more productive now.”

For the financial analysis, Forrester included fewer DBA and application developer hires. Assumptions included:

- › Average fully burdened IT FTE cost of \$130,000.
- › One fewer DBAs added in Year 1, and another avoided in Year 2.
- › Three fewer application developers added in Year 1, and growing to five by Year 3.

The amount of labor and FTE savings will vary based on the size of the existing team and size of overall operations. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year risk-adjusted total PV of \$1.6 million.

“Our data warehouse maintenance overhead went from two engineers keeping things up and running to 5% of one FTE.”

CTO, online media



Increased IT Team Productivity: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
C1	DBA savings		1	2	2
C2	Application developer savings		3	4	5
C3	Average fully loaded cost		\$130,000	\$130,000	\$130,000
Ct	Increased IT team productivity	$(C1+C2)*C3$	\$520,000	\$780,000	\$910,000
	Risk adjustment	↓10%			
Ctr	Increased IT team productivity (risk-adjusted)		\$468,000	\$702,000	\$819,000

Unquantified Benefits

In addition to the quantified benefits described above, interviewees described other benefits that could not have a financial value assigned to them. Readers should also take these into consideration as they may be as valuable as the ones that were quantified.

Improved SQL Data Warehouse Security

Interviewees used some of the advanced features in Azure SQL Data Warehouse to improve IT and data security.

- › “Managing security across all services is a lot easier. We can give people what they need to get their job done without the risk of them doing bad things because we do very low-level permissions in AD.”
- › “There was that big ransomware problem this past weekend. We had a couple of servers on-premises that were affected and had to be patched. We didn’t have to worry about anything in the Azure cloud.”
- › “Security is tighter than it used to be.”
- › “We have critical infrastructure data and sensitive customer data. It needed to be always encrypted and Azure made that very simple.”

Better Business Outcomes

Companies had better business outcomes because of improved data warehouse performance and agility. In some cases, these benefits may dwarf the cost savings quantified in the study.

- › “We are now able to make changes to our ad software in real time and see if that improves opt-in rates for a particular product. When we push out a new campaign, we can see near real-time performance metrics and fine-tune our offering.”
- › “User feedback has been incredibly positive. All managers are of the opinion that moving to Azure has been very helpful because of the improved reporting. For the first time, we can look at profitability companywide across all clients. This allowed us to implement a key account strategy for our clients that represent 90% of revenue.”
- › “We can mock up demos for salespeople faster. Azure has improved our capabilities to sell.”
- › “It used to take us too long to get things done for our biggest customers. Things that would have taken months now take weeks since moving to Azure.”
- › “For us, moving to Azure was about faster time-to-market, not cost savings.”

Flexibility

The value of flexibility is clearly unique to each customer, and the measure of its value varies from organization to organization. There are multiple scenarios in which a customer might choose to implement Microsoft Azure SQL Data Warehouse and later realize additional uses and business opportunities. Flexibility would also be quantified when evaluated as part of a specific project (described in more detail in Appendix A).

Interviewees are looking to expand their use of Azure data warehouses. Some are looking to move Linux servers to Azure, and others are looking to move more environments over, e.g., development and testing. One is adapting its Azure environment to create a “true data factory”. None of these future opportunities are included in the financial analysis.

“Security is much easier to administer now. It takes a couple of clicks to encrypt everything. We are more secure than when everything was in the colocation facility.”

Sr. solutions architect, utilities consulting



“We have had good progress winning new accounts and increasing account size by providing meaningful insights.”

CTO, online media



Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into business benefit for a future additional investment. This provides an organization with the “right” or the ability to engage in future initiatives but not the obligation to do so.

Total Costs

REF.	COST	INITIAL	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Dtr	Initial deployment	\$401,500	\$0	\$0	\$0	\$401,500	\$401,500
Etr	Ongoing operations	\$0	\$267,750	\$267,750	\$267,750	\$803,250	\$665,855
Ftr	Azure data warehouse fees	\$50,313	\$201,250	\$258,750	\$345,000	\$855,313	\$706,314
	Total costs (risk-adjusted)	\$451,813	\$469,000	\$526,500	\$612,750	\$2,060,063	\$1,773,668

Initial Deployment

Interviewees describe the setup of the Azure SQL Data Warehouse and subsequent migration as relatively fast and simple. A typical duration was two to three months.

- › “It took us just over two months to build out a new orchestration pipeline, improve data ingestion through Polybase, refine processes, and shut down previous data cubes and reports. Two people worked on this 80% of their time.”
- › “We had two people working on this at 10% for two or three months. We did not need any external resources. My people could figure out what was needed using Azure documentation.”
- › “Our partner set up the environment and created the reports we needed. It took three months. Their fee was \$450,000 and most of that was for deploy and build.”

For the financial analysis, Forrester conservatively assumed that deployment required both internal resources and professional services. The assumptions were:

- › Three months total deployment time.
- › Two FTEs at an average fully burdened cost of \$130,000.
- › Professional service fees of \$300,000.

Implementation costs may be higher depending on the size and complexity of the total deployment and if more professional services are needed. To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year risk-adjusted total PV of \$401,500.

The table above shows the total of all costs across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total costs to be a PV of more than \$1.7 million.

Implementation risk is the risk that a proposed investment may deviate from the original or expected requirements, resulting in higher costs than anticipated. The greater the uncertainty, the wider the potential range of outcomes for cost estimates.

Initial Deployment: Calculation Table

REF.	METRIC	CALC.	INITIAL
D1	Number of months		3
D2	Number of internal FTEs		2
D3	Fully loaded cost, internal resources	\$130,000/12 months	\$10,833
D4	Professional services		\$300,000
Dt	Initial deployment	$D1 * D2 * D3 + D4$	\$365,000
	Risk adjustment	↑10%	
Dtr	Initial deployment (risk-adjusted)		\$401,500

Ongoing Operations

In the Increased IT Productivity benefit section of this study, Forrester described how the effort to “keep the lights on” has been significantly reduced. Interviewees reported anywhere from 10% to one FTE working on maintaining the Azure SQL Data Warehouse estate.

For the financial analysis, Forrester conservatively took the high end of the range and included one FTE at a fully burdened cost of \$130,000 per year. Forrester also assumed ongoing professional services to assist with data reporting, analysis, and ongoing data warehouse optimization.

The amount of ongoing effort will vary depending on the size of the Azure SQL Data Warehouse deployment and to what extent professional services are used. To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year risk-adjusted total PV of \$665,855.

Ongoing Operations: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
E1	Internal resources	1 FTE @ \$130,000	\$130,000	\$130,000	\$130,000	\$130,000
E2	Professional services		\$125,000	\$125,000	\$125,000	\$125,000
Et	Ongoing operations	$E1 + E2$	\$255,000	\$255,000	\$255,000	\$255,000
	Risk adjustment	↑5%				
Etr	Ongoing operations (risk-adjusted)		\$267,750	\$267,750	\$267,750	\$267,750

Azure Data Warehouse Fees

The final cost category is fees paid to Microsoft for use of Azure SQL Data Warehouse. These fees will vary greatly based on the size of the deployment, and fees may vary from month to month based on consumption. For the financial analysis, Forrester used expected costing with standard discounts for a new deployment with the following characteristics: Two different data warehouse instances, and the size of

each is ten terabytes. Their average monthly usage is SQL DW500 and peak usage is DW1500. Costs increase over the life of the study as the amount of usage increases. Forrester recommends that readers work with Microsoft or partner account managers to calculate their organization's likely usage charges.

The Azure fees may be higher or lower depending on the amount of services consumed. To account for these risks, Forrester adjusted this cost upward by 15%, yielding a three-year risk-adjusted total PV of \$706,314.

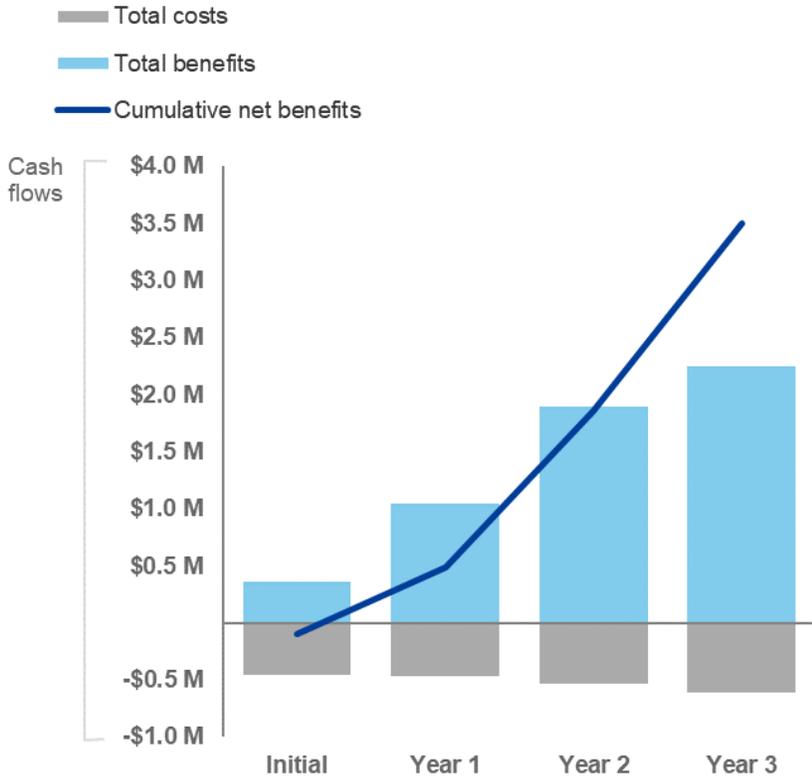
Azure Data Warehouse Fees: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
F1	Azure fees	Initial period prorated	\$43,750	\$175,000	\$225,000	\$300,000
Ft	Azure data warehouse fees	=F1	\$43,750	\$175,000	\$225,000	\$300,000
	Risk adjustment	↑15%				
Ftr	Azure data warehouse fees (risk-adjusted)		\$50,313	\$201,250	\$258,750	\$345,000

Financial Summary

CONSOLIDATED THREE-YEAR RISK-ADJUSTED METRICS

Cash Flow Chart (Risk-Adjusted)



The financial results calculated in the Benefits and Costs sections can be used to determine the ROI, NPV, and payback period for the composite organization's investment. Forrester assumes a yearly discount rate of 10% for this analysis.



These risk-adjusted ROI, NPV, and payback period values are determined by applying risk-adjustment factors to the unadjusted results in each Benefit and Cost section.

Cash Flow Table (Risk-Adjusted)

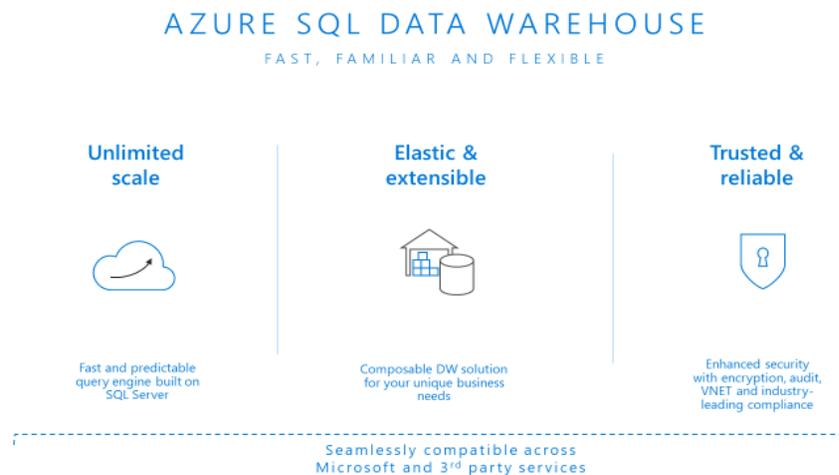
	INITIAL	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Total costs	(\$451,813)	(\$469,000)	(\$526,500)	(\$612,750)	(\$2,060,063)	(\$1,773,668)
Total benefits	\$360,000	\$1,048,500	\$1,899,000	\$2,250,000	\$5,557,500	\$4,573,062
Net benefits	(\$91,813)	\$579,500	\$1,372,500	\$1,637,250	\$3,497,438	\$2,799,393
ROI						158%
Payback period						<6 months

Microsoft Azure SQL Data Warehouse: Overview

The following information is provided by Microsoft. Forrester has not validated any claims and does not endorse Microsoft or its offerings.

Azure SQL Data Warehouse is the SQL analytics platform that lets you scale compute, and storage elastically and independently, with massively parallel processing. Seamlessly integrate SQL Data Warehouse with big data stores, and create a hub to drive highly tailored and enterprise grade performance for your data marts and cubes, allowing a limitless number of users to interact.

Azure SQL Data Warehouse offers a guaranteed 99.9% availability, regulatory compliance, advanced security features, and tight integration with upstream and downstream services so you can build a data warehouse that fits your needs. SQL Data Warehouse is the first service enabling enterprises to replicate data virtually anywhere around the globe.



Critical capabilities include:

- › **Lightning-fast provisioning:** Provision and scale compute to thousands of cores in under 5 minutes for incredibly fast performance.
- › **Elastic compute and storage:** SQL Data Warehouse allows you to independently scale compute and storage to adjust to your unique business needs.
- › **Advanced security:** Built-in features include VNET service endpoints, always-on encryption, audit, and managed access through Azure Active Directory.
- › **Cloud-scale data processing:** SQL Data Warehouse is built for the massively parallel-processing of large amounts of data and can handle the most demanding big-data analytics tasks.
- › **SQL Server foundation:** SQL Data Warehouse is built on SQL Server, the industry's top-performing SQL engine, with the most comprehensive support for SQL language.
- › **Limitless concurrency:** By integrating with Azure SQL Database and Azure Analysis Services, there is no limit to how many users can interact.
- › **Simplicity:** SQL Data Warehouse is a fully managed cloud data warehouse that automatically handles infrastructure, optimization, and more, so that you can focus on driving value from your data.
- › **Ecosystem integration:** Native integration with leading data management and business intelligence vendors, as well as Microsoft services, to accelerate your time to value for a finished solution.
- › **Global availability:** SQL Data Warehouse is available in more than 30 regions, making it the most geographically available data warehouse service in the cloud. Keep your data where your users are.
- › **Industry-leading compliance:** SQL Data Warehouse has more than 20 government and industry certifications, including GDPR and HIPPA, to protect your data and keep it sovereign.

Appendix A: Total Economic Impact

Total Economic Impact is a methodology developed by Forrester Research that enhances a company's technology decision-making processes and assists vendors in communicating the value proposition of their products and services to clients. The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

Total Economic Impact Approach



Benefits represent the value delivered to the business by the product. The TEI methodology places equal weight on the measure of benefits and the measure of costs, allowing for a full examination of the effect of the technology on the entire organization.



Costs consider all expenses necessary to deliver the proposed value, or benefits, of the product. The cost category within TEI captures incremental costs over the existing environment for ongoing costs associated with the solution.



Flexibility represents the strategic value that can be obtained for some future additional investment building on top of the initial investment already made. Having the ability to capture that benefit has a PV that can be estimated.



Risks measure the uncertainty of benefit and cost estimates given: 1) the likelihood that estimates will meet original projections and 2) the likelihood that estimates will be tracked over time. TEI risk factors are based on "triangular distribution."

The initial investment column contains costs incurred at "time 0" or at the beginning of Year 1 that are not discounted. All other cash flows are discounted using the discount rate at the end of the year. PV calculations are calculated for each total cost and benefit estimate. NPV calculations in the summary tables are the sum of the initial investment and the discounted cash flows in each year. Sums and present value calculations of the Total Benefits, Total Costs, and Cash Flow tables may not exactly add up, as some rounding may occur.



PRESENT VALUE (PV)

The present or current value of (discounted) cost and benefit estimates given at an interest rate (the discount rate). The PV of costs and benefits feed into the total NPV of cash flows.



NET PRESENT VALUE (NPV)

The present or current value of (discounted) future net cash flows given an interest rate (the discount rate). A positive project NPV normally indicates that the investment should be made, unless other projects have higher NPVs.



RETURN ON INVESTMENT (ROI)

A project's expected return in percentage terms. ROI is calculated by dividing net benefits (benefits less costs) by costs.



DISCOUNT RATE

The interest rate used in cash flow analysis to take into account the time value of money. Organizations typically use discount rates between 8% and 16%.



PAYBACK PERIOD

The breakeven point for an investment. This is the point in time at which net benefits (benefits minus costs) equal initial investment or cost.