

**Statement of Dilip Krishna,  
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Testimony Before the  
House Financial Services  
Subcommittee on Oversight & Investigations**

**On**

**July 14, 2011**

**In**

**Rayburn House Office Building, Room 2128**

**At**

**2:00 P.M.**

**A Hearing entitled:**

**“Oversight of the Office of Financial Research and Financial Stability  
Oversight Council”**

Chairman Neugebauer, Ranking Member Capuano, and members of the Subcommittee, my name is Dilip Krishna representing Teradata Corporation. Thank you for the invitation to offer testimony today before your Subcommittee.

Teradata, the company I represent, is among the world’s largest companies focused solely on data analytics and data warehousing. Our technology allows business and government to leverage detail-level data for both tactical decision making and strategic insight, to recognize emerging trends and respond quickly and appropriately. As an example, many of Teradata’s customers apply analytic techniques to detect and respond in seconds to fraudulent activity, allowing them to save hundreds of millions of dollars per year. In many cases, Teradata’s customers have used analytic technology to completely transform the way they do business.

Our government customers within the US include the Centers for Medicare and Medicaid Services, the U.S. Air Force, the US Transportation Command, the US Department of Justice, the US Postal Service, the USDA Risk Management Agency and the States of Texas, California, New Jersey, Iowa, Oklahoma, Maryland and Missouri to name a few. Over 50% of the world's largest financial companies use Teradata for strategic purposes including risk management and customer management, with an extension to tactical areas such as customer service enhancement. A Teradata database has been implemented in more than 900 major corporations in every business sector so that on any given business day in almost every industry throughout the world, well over a million users access a Teradata warehouse as they make decisions.

### **Teradata's Position – Using Technology for Financial Oversight**

The recent economic crisis has taught us that our financial institutions are truly a national asset, the abuse of which is to the detriment of every American. Responsibly managed financial institutions, of which there are many, are the bulwark of our economic system. At the same time, the irresponsible behavior of some in the industry has cost the American taxpayer dearly and eroded our nation's position globally.

Thorough and effective oversight of the financial system is therefore critical to our nation's success. At the same time, we all want efficient government that will contribute to our competitiveness globally and ensure a leadership position internationally. And critically, we need to ensure that the emerging system of financial oversight continues to allow the financial sector to provide the high level of innovation and leadership that has propelled the prosperity of our market-based system for over two centuries. Teradata's experience over the past 30 years has shown us that information technology is the catalyst that can create smaller, but smarter governments. All around us, we see evidence that the proper use of technology can generate immensely valuable results while at the same time cost-effectively improving efficiency, productivity and customer service. Now is the time to apply technology to address this most important issue of systemic oversight.

The good news is that a vast amount of work has already been done with technology in finance. Technology has advanced to the point where the technical challenges of oversight of large, complex financial enterprises to manage risks is now feasible. In fact, large banks and other financial institutions around the globe routinely use data management and analytics technology for financial risk management.

### **Use of Data and Analytics in Financial Institutions**

Financial institutions have been using analytical information technology to improve the efficiency of their businesses for quite some time. Information technology makes it possible for companies to collect, merge and analyze very large amounts of customer data in real time to better and more efficiently serve their customers, leading to

competitive advantage. Technology has also made it possible for financial firms to manage their risks effectively while managing substantial growth and consolidation in their business lines. For example, banks are able to serve a growing number of customers even as they keep a tight control on fraud through the use of advanced, real-time information technology that combines data on current activity and provides insight into and comparisons with historic trends and behaviors. Systems have also been developed that give them a view to their firm-wide risk exposure on a frequent basis.

It may well be asked why, with all these advanced systems, these financial firms experienced such unprecedented losses during the economic crisis. The answer is simply that like any other tool, technology can only be useful if it is employed properly. I will explain in more detail later in my testimony, but this is especially important in the implementation of the Office of Financial Research.

### **Transparency and Financial Oversight**

Transparency is the cornerstone of financial oversight and relies on two principles:

1. The goals of information disclosure are well understood: Clearly determined goals of disclosure enable financial institutions to easily disclose the right sort of information required for oversight. At the same time, regulators and by extension, the public at large can get an unambiguous understanding of the strength of the regulated institutions. It is critically important that the information be timely and accurate so that appropriate action may be taken if warranted.
2. The information assembly line is robust: Data needs to be complete and detailed while it is transformed into useful information as it moves from the transaction systems to the point of disclosure. Confidence in the reported information can only be gained when there is confidence in the robustness of the assembly line (for example, via knowledge that all changes during the process of creating the information are fully audited and controlled).

### **The Information Assembly Line**

Information is knowledge derived from raw data. Data collected from across the financial sector for the purposes of oversight must be interpreted before it is useful. A series of steps is required to cleanse data before it can be used and interpreted. Once data is conformed in this manner, it can be analyzed in ways consistent with the goals of financial oversight.

The process is similar to that within a factory assembly line. The raw material is data that is collected from across the financial landscape, including data already being submitted by financial institutions to regulators as well as relevant market and statistical

data from a number of sources. Data then needs to be cleansed and otherwise modified so that data from all sources are brought into parity. This can be likened to a manufacturing process where raw material is processed to deliver finished goods – in this case the output is information. Another similarity is that in the manufacturing process, the product quality depends heavily on the quality of the raw materials. Data quality and a solid data foundation is a critical but often overlooked component of this information assembly line. A fortunate departure from this analogy is that the “raw material” of input data is still available after processing, so it can be re-used repeatedly for any other analysis that is conceived in the future.

The finished goods must be stored in a warehouse before being distributed – the Enterprise Data Warehouse. The data warehouse then serves to distribute information both for monitoring and predictive analysis. For example, statistical analysis software can be used to reduce large amounts of data to easily interpretable figures. Financial models can be developed to run periodically against data in the warehouse with the results of these models being used in a monitoring process. Finally, information must be distributed to regulatory authorities and other information consumers. This discipline, called Data Visualization, specializes in aggregating and presenting information in tangible ways that can bring trends and patterns to life.

This data assembly line is becoming accepted as a common way of creating processed information for improved decision making from multiple sources of data. Technology firms from across the industry espouse the same vision, and their customers in every industry are responding by implementing this vision in their enterprises.

### **Information Needs of Financial Oversight**

Financial oversight critically depends on a deep understanding of the situation at hand at all times. There are two broad aspects to be addressed – monitoring and predictive analysis.

An efficient system for monitoring known risks is essential if we are not to repeat the painful and costly lessons of history. We have learned a lot from past financial crises, and financial technology provides us with tools to automatically detect, and in some cases compensate for, situations similar to the ones we have seen before. A monitoring system expects to see the same data within pre-defined periods of time such as every day, every month or every quarter. The mathematical models that are run against this data must be consistent to enable periodic comparisons. Unexpected deviations in the output of these models act as warning indicators. Once warnings are seen the system must allow the ability for rapid, flexible research into the root cause of the problem so proactive steps may be taken while still impactful. Data used for monitoring must be prepared to “industrial-strength” standards of quality and timeliness.

But just monitoring *known* risks is not enough. Regulators will only fulfill their mandate if they are able to look for and head-off *new* risks that have not been encountered before. This is especially critical in the dynamic and ever-changing environment that is the norm in the modern financial landscape. Therefore, it is very important for an oversight mechanism to also constantly be on the lookout via Predictive Analysis for risks that are not known. Predictive risk analysis can be likened to scientific research. Economists and regulators looking for new problems use a “test-and-learn” process. That is to say, they first have a hunch of what can go wrong. Then they use information to either confirm or invalidate their hypothesis. The information system must therefore have immense flexibility and agility to answer their questions “at the speed of thought”. Furthermore, the system must serve up this information *without having a pre-conceived notion of what they will want to know about*. The system must also be able to incorporate information from new sources on demand.

A robust and efficient information assembly line is critical to both functions. However, these two requirements of oversight have conflicting needs – industrial-strength robustness vs. lab-environment flexibility. What is exciting about today’s information technology capabilities is that both of these needs can be satisfied by the same analytic system to at once support a complete, robust oversight environment that is also cost-effective. Leading financial companies are using such systems to stop fraud in real-time (via monitoring) as well as enabling users (via predictive analysis) to develop newer, more effective models to stop the next-generation of fraudsters, both tasks being performed *on the same system with the same information* which reduces conflicting viewpoints and connects the dots between transactions, trends and risk.

### **The Office of Financial Research**

The Office of Financial Research has been tasked with a pivotal role in financial oversight by creating a robust data and analytic capability to the regulatory community and the Financial Stability Oversight Council. Systemic risk, as we have seen all too clearly, can threaten not the financial system but indeed, the underpinnings of the global economy as well. Yet individual financial institutions cannot realistically possess the knowledge of the overall economy to predict and prevent systemic risk. Not only would this be prohibitively expensive to these institutions, but it would also require them to know potentially sensitive information about one another.

Therefore, it only makes sense that a governmental entity, with a clearly determined mandate and public accountability, be responsible for the task. The Office of Financial Research is eminently suited to the job of collecting data and conducting research under the financial reform act. The Office has been given a sufficient mandate to enable it to achieve the data and analytic capability required for financial oversight and the authorities – under Section 154 of the Act – to achieve this goal. I believe that the Office of Financial Research, in short, is a critical component to the task of making our financial system safer.

During the Dodd/Frank debate, Teradata along with a group of other IT companies and interest groups worked with Congressman King and Congresswoman Maloney on several amendments to clarify the OFR's structure and direction. Unfortunately those amendments were not accepted and regardless of the outcome, Congressman King and Congresswoman Maloney, both members of the Full Committee, have worked tirelessly to promote the use of technology in financial oversight. Additionally, Chairman Issa has been a leader in this area as well and is currently proposing a DATA bill which addresses many of the same concerns for the need to employ information technology more strategically, beginning with streamlining Federal IT systems and harmonizing procurement processes.

Now that the OFR has been established in the Dodd/Frank legislation, it is important to understand that a journey of one thousand miles begins with a single step. That first step must be where we are today. And where we are today is this: The Research and Analysis Center, the entity responsible for developing a viable systemic risk analysis framework for the Financial Stability Oversight Council, depends upon the Data Center for establishing a strong data foundation upon which to build its analytic capabilities. I offer the following comments in support of the establishment and development of the Data Center based on practices that Teradata has learned from working with many of the world's largest data warehouses.

Several financial institutions have, for their own risk management and financial reporting purposes, developed data repositories similar to that envisioned for the OFR. The common principle employed by the most successful of such efforts is to "Think big but start small". They combine an ambitious long-term agenda with a small, well-scoped initial phase of the program that is targeted to deliver to a specific need. The mandate of the Office is nothing if not ambitious – what is needed now is for it to rapidly deploy a tightly scoped initial version of the Data Center. The initial version must be designed to deliver real value to its stakeholders, but also build a solid foundation – with the flexibility to evolve toward the longer term vision and future, undetermined needs – upon which the full potential of the Data Center can be realized.

The first task of a data resource like the Data Center is to quickly become useful. Data problems abound so the area is rich in opportunities for usefulness. Robust financial reference data is necessary for accurate risk analysis and reporting, but this has been consistently difficult to create and maintain across the industry. The failure to do so is one of standardization, not technology. The Office has been given the authority, as well as the responsibility, to mandate these standards. In our opinion, this is a critical first step to the process of making the Office a critical and useful tool of public policy. The benefits of proper, standardized reference data go well beyond allowing the Research Center capabilities in systemic risk analysis and monitoring, however. The Office can supply this data – most of which is of a non-competitive nature anyway – to financial

institutions themselves to improve their risk management efforts and make the system doubly secure.

A key principle in setting these standards is making the perfect the enemy of the good. The vast majority of issues surrounding reference data are not controversial. In fact, much of the financial instrument and financial company reference data is already available via data vendors. I would urge the Office to leverage existing databases to the extent possible, with the main focus of initial effort being to quickly create a single declared set of reference data available for the use by the Research Center as well as financial institutions themselves providing the appropriate security safeguards are put in place. This single authoritative source of reference data can then be perfected over time.

But reference data is not enough. Risk analysis in the financial sector requires the use of detailed positional, and in some cases transaction, data on a periodic basis. The same principle must be applied to this data as well. There are many barriers to perfectly standardizing position and transaction data across all the major systemically important financial institutions. None of these barriers, in our opinion, are formidable enough to prevent the Office from using what is available for gross systemic risk computations. In fact, using position and transaction data for risk analysis will act as a catalyst for improving the quality of such data over time.

If the Data Center is to fulfill its mandate in the long term, it must be collect all the data it requires on a regular basis. In our experience, data analysis efforts can only be successful if disciplines are in place to integrate and aggregate data on a periodic basis. In fact, this practice is the essential lubricant for a well-oiled data machine. Therefore I would strongly argue against any suggestion that the Office should restrict itself to standard-setting to the exclusion of physically collecting data on a periodic basis wherever such data is available – whether from member agencies or from financial companies themselves.

A data repository such as this would contain much sensitive data. Specifically, positions and transactions submitted by financial institutions could have far-reaching competitive consequences if placed in the wrong hands. The malicious potential use of data collected on private citizens can also be significant. Therefore, data security must be taken very seriously by the Office. The so-called “CIA Triad” is a useful framework for a security program, and encompasses Confidentiality (preventing access to unauthorized data), Integrity (preventing modification of unauthorized data) and Availability (preventing disruption of access of data to authorized users). The importance of data security cannot be over-stated – I would strongly suggest that effort to secure data collected by the Office should be at least on par with the effort to collect the data itself.

### **Leveraging Information Technology for Financial Oversight**

The good news is that the technology and best-practices required to achieve all these goals is available. The age of Big Data has arrived with the result that all aspects of technology and techniques necessary to create an efficient information assembly line are being perfected at this time. For example, there are a number of high-performance offerings that deal with the quality of raw data. Technology for data warehousing has developed to the extent that it is not uncommon to see systems processing truly massive amounts of data, yet are able to react in seconds to customer activity. Finally, analytics and visualization technologies have also advanced significantly so that complex calculations can be completed and presented extremely rapidly, in time-scales considered impossible just a few years ago. Not only are the capabilities improving at a tremendous rate, but costs are also dropping precipitously. Indeed, these changes are rapidly changing the landscape of American business. Many of today's most successful companies – in a range of industries including Manufacturing, Finance and Social-networking - base their very businesses on such data technology.

Chairman Neugebauer and members of the Subcommittee, the time has never been better for leveraging information technology to create a strong system of financial oversight that is also cost effective. *Smarter government leads to smaller government – a savings for the nation's taxpayers.*

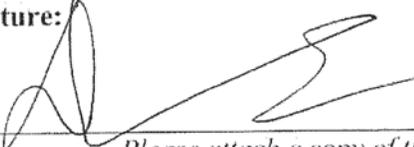
I believe that the Office of Financial Research will play a critical role in preventing the kind of catastrophic systemic failure as we experienced in 2008. However, the Office will need to start playing a relevant role quickly. The best way for it to do so is to leverage tried-and-true data management methods and analytic technologies to rapidly form the nucleus of a database of reference, position and transaction data to support the practice of systemic risk analysis.

Again, thank you for the opportunity to testify this afternoon. I look forward to answering your questions.

United States House of Representatives  
Committee on Financial Services

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Clause 2(g) of rule XI of the Rules of the House of Representatives and the Rules of the Committee on Financial Services require the disclosure of the following information. A copy of this form should be attached to your written testimony.

<b>1. Name:</b>  Dilip Krishna	<b>2. Organization or organizations you are representing:</b>  Teradata Corporation
<b>3. Business Address and telephone number:</b> 	
<b>4. Have <u>you</u> received any Federal grants or contracts (including any subgrants and subcontracts) since October 1, 2008 related to the subject on which you have been invited to testify?</b>  <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<b>5. Have any of the <u>organizations you are representing</u> received any Federal grants or contracts (including any subgrants and subcontracts) since October 1, 2008 related to the subject on which you have been invited to testify?</b>  <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>6. If you answered .yes. to either item 4 or 5, please list the source and amount of each grant or contract, and indicate whether the recipient of such grant was you or the organization(s) you are representing. You may list additional grants or contracts on additional sheets.</b>	
<b>7. Signature:</b> 	

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