



K. J. Somaiya Institute of Management Studies & Research

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Quantinum Newsletter



Quantinum -
The Quants Forum

Its all about **NUMBERS...**



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From the Faculty's Desk...

Hi All,

We are near another yearend for Quantinum and a new year beginning for all of us. Quantinum will be celebrating its annual day during January 2012 and hopefully lay more foundation for useful and intellectual projects to be done by students.

Contributions from everyone are welcome. We also request the readers to write in with their suggestions and comments on the newsletter.

Happy reading.

Regards
Prof N.S.Nilakantan

TEAM QUANTINUUM

MAIN STORY : ECONOMETRICS

ECONOMISTS develop economic models which link one or more economic variables to other economic variables. This is to explain consistently recurring relationships. Few models provide useful clues to the magnitude of the association. Yet this is what matters most to policymakers. When setting monetary policy, for example, central bankers need to know the likely impact of changes in official interest rates on inflation and the growth rate of the economy. It is in cases like this that economists turn to econometrics.

Econometrics has been defined as "the application of mathematical and statistical methods to economic data". In other words, it turns theoretical economic models into useful tools for economic policymaking. The objective of econometrics is to convert qualitative statements (such as "the relationship between two or more variables is positive") into quantitative statements (such as "consumption expenditure increases by 95 cents for every one dollar increase in disposable income").

Two main purposes of econometrics are to give empirical content to economic theory by formulating economic models in testable form, to estimate those models, and to test them as to acceptance or rejection. For example, consider one of the basic relationships in economics: the relationship between the price of a commodity and the quantities of that commodity that people wish to purchase at each price (the price-demand relationship). According to economic theory, an increase in the price would lead to a decrease in the quantity demanded, holding other relevant variables constant so as to isolate the relationship of interest. A mathematical equation can be written that describes the relationship between quantity, price, other demand variables like income, and a random term ϵ to reflect simplification and imprecision of the theoretical model:

$$Q = \beta_0 + \beta_1 \text{Price} + \beta_2 \text{Income} + \epsilon.$$

Regression analysis could be used to estimate the unknown parameters β_0 , β_1 , and β_2 in the relationship, using data on price, income, and quantity. The model could then be tested for statistical significance as to whether an increase in price is associated with a decrease in the quantity, as hypothesized: $\beta_1 < 0$.

Econometrics can be divided into theoretical and applied components.

Theoretical econometricians investigate the properties of existing statistical tests and procedures for estimating unknowns in the model. They also seek to develop new statistical procedures that are valid (or robust) despite the peculiarities of economic data—such as their tendency to change simultaneously. Theoretical econometrics relies heavily on mathematics, theoretical statistics, and numerical methods to prove that the new procedures have the ability to draw correct inferences.

Applied econometricians, by contrast, use econometric techniques developed by the theorists to translate qualitative economic statements into quantitative ones. Because applied econometricians are closer to the data, they often run into—and alert their theoretical counterparts to—data attributes that lead to problems with existing estimation techniques. For example, the econometrician might discover that the variance of the data (how much individual values in a series differ from the overall average) is changing over time.

ECONOMETRICS(CONTD.)

Stages of development

The methodology of econometrics is fairly straightforward.

The first step is to suggest a theory or hypothesis to explain the data being examined. The explanatory variables in the model are specified, and the sign and/or magnitude of the relationship between each explanatory variable and the dependent variable are clearly stated. At this stage of the analysis, applied econometricians rely heavily on economic theory to formulate the hypothesis. For example, a tenet of international economics is that prices across open borders move together after allowing for nominal exchange rate movements (purchasing power parity). The empirical relationship between domestic prices and foreign prices (adjusted for nominal exchange rate movements) should be positive, and they should move together approximately one for one.

The second step is the specification of a statistical model that captures the essence of the theory the economist is testing. The model proposes a specific mathematical relationship between the dependent variable and the explanatory variables—on which, unfortunately, economic theory is usually silent. By far the most common approach is to assume linearity—meaning that any change in an explanatory variable will always produce the same change in the dependent variable (that is, a straight-line relationship).

The third step involves using an appropriate statistical procedure and an econometric software package to estimate the unknown parameters (coefficients) of the model using economic data. This is often the easiest part of the analysis thanks to readily available economic data and excellent econometric software. Still, the famous GIGO (garbage in, garbage out) principle of computing also applies to econometrics also. Just because something can be computed doesn't mean it makes economic sense to do so.

The fourth step is by far the most important: administering the smell test. Does the estimated model make economic sense—that is, yield meaningful economic predictions? For example, are the signs of the estimated parameters that connect the dependent variable to the explanatory variables consistent with the predictions of the underlying economic theory? (In the household consumption example, for instance, the validity of the statistical model would be in question if it predicted a decline in consumer spending when income increased). If the estimated parameters do not make sense, how should the econometrician change the statistical model to yield sensible estimates? And does a more sensible estimate imply an economically significant effect? This step, in particular, calls on and tests the applied econometrician's skill and experience.

The linear multiple regression model, used in econometrics, provides a formal approach to estimating how a change in one economic variable, the explanatory variable, affects the variable being explained, the dependent variable—taking into account the impact of all the other determinants of the dependent variable. This qualification is important because a regression seeks to estimate the marginal impact of a particular explanatory variable after taking into account the impact of the other explanatory variables in the model.

MANISHA AGRAWAL
EDITORIAL TEAM



QUANT NEWS DIGEST

Future Prostate Cancer Treatments Might Be Guided by Math

Scientists have designed a first draft of a mathematical model that someday could guide treatment decisions for advanced prostate cancer, in part by helping doctors predict how individual patients will respond to therapy based on the biology of their tumors.

Though the model's outcomes remain theoretical at this point, the researchers have developed enough of a system to show that their incorporation of some personalized data -- details about a patient's tumor cell characteristics in particular -- would give doctors more than they currently have to work with in making decisions about this stage of treatment.

The model is described this week in the online early edition of the Proceedings of the National Academy of Sciences. Harsh Jain, a postdoctoral fellow in Ohio State University's Mathematical Biosciences Institute and lead author of the study, conducted the work with co-authors Steven Clinton, professor, and Arvinder Bhinder, assistant professor-clinical, in Ohio State's division of medical oncology, and Avner Friedman, a Distinguished University Professor at Ohio State.

Prostate cancer is diagnosed in about 240,000 American men and leads to about 34,000 deaths each year, according to the National Cancer Institute.

Currently, continuous treatment to eliminate testosterone is the standard of care. The math model developed by Ohio State scientists suggests that based on average clinical data currently available, such intermittent therapy could actually accelerate the development of castration resistance.

However, the averages don't always apply, which is why the scientists are pursuing a system of differential equations to account for individual differences. Math offers some answers. The model's foundation is based on existing animal and human data on prostate cancer characteristics. Beyond that, the researchers have selected parameters to plug into the equations that more specifically detail what could be going on in an individual tumor: cancer cell growth rates, cancer cell death rates, the level of activation of PSA in tumor cells, and how quickly one person's PSA can travel from the prostate to the bloodstream.

The scientists even took into account the competitive power of individual types of cancer cells -- for example, some mutated cancer cells aren't as strong as their normal cancer cell counterparts. In those cases, the math model predicts, the best treatment option would be intermittent therapy because the stronger normal cancer cells would keep mutant cells in check during time off from the medication. "That's an important question with any therapy -- is it making things better or worse in terms of allowing mutated cells to take over?" Jain said.

Jain and colleagues are now working to boost the model's power by adding parameters that account for the blood vessel architecture in prostate tumors, a major indicator of how persistent the cancer will be. They also plan to add hundreds of individual patients' case study data to make its predictions even more authentic.

Editor's Note:- Read more: <http://www.sciencedaily.com/releases/2011/11/111121194037.htm>

Compiled by Editorial Team

QUANT NEWS DIGEST contd..

Google Spruces Up YouTube Analytics

Late last month, having launched a revamped Google Analytics solution, a number of mobile search engine updates, and the even more ballyhooed Google+ platform, Google revealed the fruit of its development labor on the YouTube Insights video measurement platform. Google's focus on its video platform has much to do with increased mobile video viewing. A report from eMarketer said US mobile video viewers reached 45.1 million in 2011 and will hit 78.1 million -- nearly a quarter of the U.S. population -- by 2015.

Add this forecast to YouTube's search capacity (it's recognized as one of the largest search engines). Mix those points with Google's introduction of mobile-centric features in its online search engine, and you have a recipe for YouTube Analytics.

To create the platform, Google rearranged some of the YouTube Insights reporting segments with a consideration for mobile and application influences. It revised the user interface so that selectors and buttons control the appearance of charts and graphs, and it eliminated slider graphs for date ranges.

YouTube Analytics introduces reporting segments but mostly rearranges them. For example, the new segment Engagement replaces Community and groups Likes, Dislikes, and Shares together. Another new segment is Audience Retention, which replaces Hot Spots and reveals how long viewers are watching a video.

Editor's Note:- Read more: http://www.allanalytics.com/author.asp?section_id=1462&doc_id=237085

Orlando Magic reaps benefits of business intelligence tools

Business intelligence solutions are helping one basketball team in the US to create a closer relationship with its fans.

Orlando Magic is using data analytics to customize the experience its supporters have and form a tighter bond, KM World reports. A planned digital ticketing system will give it access to data about fans that can be employed to boost efficiency and further customize the experience of following the team by delivering tailored special offers to regular attendees. The organization is deploying more software in order to provide its coaching staff with enhanced reporting and analysis of games, producing a range of automated statistics that could be used to improve performance.

"We treat fan relationships as long-term partnerships," declared Orlando Magic director of business strategy Anthony Perez. He added that data warehousing technology has been employed by the team to enhance its operations and connect sources. Mr Perez also noted analytics have helped to establish a "touch point strategy" that offers information about unused tickets.

An article published last year by Silicon.com highlighted the increasing use of business intelligence reporting by sports teams, with the news source pointing in particular to UK soccer club Manchester City and rugby union team London Irish as early adopters of the technology. It explained that Gartner was forecasting strong growth in the field of business data analysis during 2011 and noting it was "finding a particular niche in the sports world".

As the volume of information held by organizations continues to grow, more and more are expected to turn to data analysis tools in order to make sense of it during 2012.

Compiled by Editorial Team

Importance of No. 18

We as Indians are proud of Aryabhata who invented the zero. Age of 18 gives us right to suffrage and at the age of 18 it is expected from us that we will make wise decisions. Similarly every number carries significance. In this article we will see the importance of number 18.

The puranas are 18 in number they are:-

- | | | |
|----------------------|--------------------------|----------------------|
| 1) Vishnu Purana | 2) Naradiya Purana | 3) Padma Purana |
| 4) Garuda Purana | 5) Varaha Purana | 6) Bhagavata Purana |
| 7) Brahmanda Purana | 8) Brahmavaivarta Purana | 9) Markandeya Purana |
| 10) Bhavishya Purana | 11) Vamana Purana | 12) Brahma Purana |
| 13) Matsya Purana | 14) Kurma Purana | 15) Linga Purana |
| 16) Shiva Purana | 17) Skanda Purana | 18) Agni Purana |

More ever, The Mahabharata is divided into 18 parvas (books).

There are 18 chapters in the Bhagavad Gita.

The Kurukshetra War which the epic depicts, is between 18 armies (11 on the Kuru side, 7 on the Pandava).

The Kurukshetra war was fought for 18 days.

In Ancient Roman custom the number 18 can symbolise a blood relative.

The Hebrew word for "life" is *חַי* (*chai*), which has a numerical value of 18. Consequently, the custom has arisen in Jewish circles to give donations and monetary gifts in multiples of 18 as an expression of blessing for long life.

Jews will often wear a Chai on a necklace, sometimes with a Star of David or Hamsa.

Chai is pronounced as if you were saying "hi" in English.

It means "life," the Chai is consequently a symbol that captures an important aspect of Judaism. According to the *gematria*, which is a mystical tradition that assigns a numerological value to Hebrew letters, the letters Het (ח) and Yud (י) add up to the number 18. The Het has a value of 8 and the yud has a value of 10. As a result, 18 is a popular number that

represents good luck. At weddings, bar mitzvahs and other events Jews often give gifts of money in multiples of 18, symbolically giving the recipient the gift of "life" or luck.

In the Chinese mythos, Hell has 18 levels. In Chinese tradition, the number 18 is normally 十八 (*shí bā*), meaning that one is going to prosper. Thus, building floors numbered "18" are often very expensive in China. Contrastingly, though, the floor 18 of a building in Northern China is viewed as a floor to be avoided, as one can never return from the 18th level of hell.



**SATYADEV
EDITORIAL TEAM**

It's All About Numbers contd..

FOUR

Geographers divide the ocean into **four** major sections: the Pacific, Atlantic, Indian, and Arctic. Smaller ocean regions are called seas, gulfs, and bays, such as the Mediterranean Sea, Gulf of Mexico, and the Bay of Bengal. Stand-alone bodies of saltwater like the Caspian Sea and the Great Salt Lake are distinct from the world's oceans.

FIVE

Five Future Techs for Passenger Air Travel

Mid-Air Refill

A common practice in the military, mid-air refueling has not spread to the commercial aviation industry yet, in part because of the vast infrastructure that would be required to support it.

Taking a Page From Nature

In the future, planes on overseas or long-haul flights could fly in V-shaped formations for fuel savings of up to 12 percent, according to the IMechE report. Geese and other birds use this strategy to save energy on long flights.

Scrambling for Power

Scramjet engines have no moving parts and instead simply suck in all the oxygen they need from the air to burn hydrogen fuel. However, to gather air that is compressed and hot enough for ignition to occur, scramjets work only at very high velocities—Mach 5 or greater.

The Next Concorde?

Shaped like a giant dart, Lockheed Martin's Supersonic Green Machine, would be capable of cruising at speeds of more than Mach 1.6, or nearly twice the speed of sound.

If built, planes such as the Supersonic Green Machine would be the successors of the Concorde and the Tupolev Tu-144, the only supersonic plane designs to fly commercially. The Concorde, however, was an economic failure because of its expensive upkeep and the high cost of a ticket, which could run to several thousands of dollars. Due to engineering advances, a supersonic airplane could be built better and more cheaply today.

Merging the Elements

An experimental Boeing X-48B aircraft sports a unique design that smoothly combines its body and wings. The X-48B's "blended wing body" could become a popular template for commercial passenger planes in the coming decades because of its fuel-saving potential, according to a new report by the U.K.'s Institution of Mechanical Engineers (IMechE).

SIX

Tree kangaroos are found only in the rain forests of Australia, West Papua, and Papua New Guinea. **Six** of ten species are found in Papua New Guinea, in some of the last undisturbed rain forest habitat in the world.

Compiled by Prof. N S NILAKANTAN



QUANT *GURU* of the MONTH



12th March 1945 -
21st December 1976

QUANT TRIVIA

"26 is the only positive number to be directly between a square and a cube"

Vijay Kumar Patodi was born in Guna on March 12th 1945. He was an Indian mathematician who made fundamental contributions to differential geometry and topology. He was the first mathematician to apply heat equation methods to the proof of the Index Theorem for elliptic operators.

Patodi was a graduate of Government High School, Guna, Madhya Pradesh. He received his bachelor's degree from Vikram University, Ujjain, and his master's degree from the Benaras Hindu University. He worked as a mathematician. He had done his Ph.D. from the University of Bombay under the guidance of M. S. Narasimhan and S. Ramanan at the Tata Institute of Fundamental Research(Mumbai).

Mathematical fame for Patodi came early in his career with papers of great importance coming for the work of his Ph.D. His doctoral thesis, *Heat equation and the index of elliptic operators*, was supervised by M S Narasimhan and S Ramanan and the degree was awarded by the University of Bombay in 1971.

Patodi's first paper *Curvature and the eigenforms of the Laplace operator* was part of his thesis.

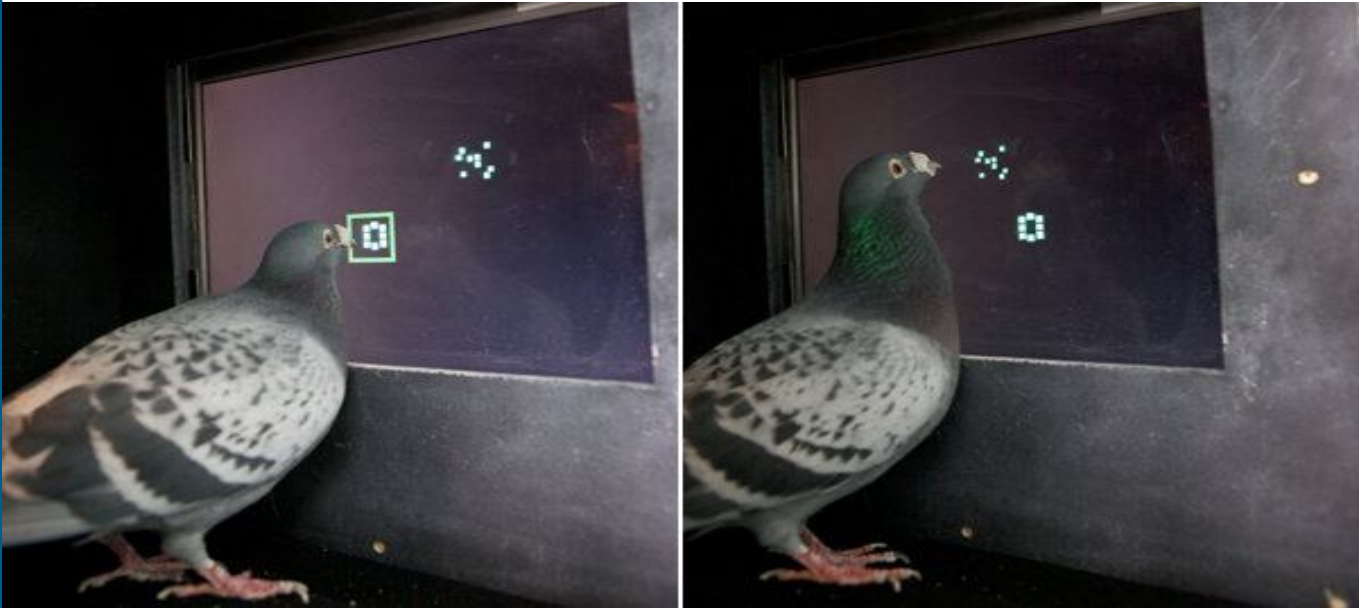
The second paper which came from his thesis was an analytic proof of the Riemann- Roch-Hirzebruch theorem for Kaehler manifolds which extended the methods of his first paper to a much more complicated situation.

He was invited to spend 1971–1973 at the Institute for Advanced Study in Princeton, New Jersey, where he collaborated with Michael Atiyah, Isadore Singer, and Raoul Bott. The joint work led to a series of papers, "Spectral Asymmetry and Riemannian Geometry" with Atiyah and Singer, in which the η -invariant was defined. This invariant was to play a major role in subsequent advances in the area in the 1980s.

Patodi was promoted to full professor at Tata Institute at age 30, however, he died at age 31, as a result of complications prior to surgery for a kidney transplant.

HARSHITA SRIVASTAV
EDITORIAL TEAM

FUN FACTS: Quants in a lighter vein



By now, the intelligence of birds is well known. Alex the African gray parrot had great verbal skills.

Pigeons, it turns out, are no slouches either. It was known that they could count. But all sorts of animals, including bees, can count. Pigeons have now shown that they can learn abstract rules about numbers, an ability that until now had been demonstrated only in primates.

They learned to rank groups of one, two and three items in various sizes and shapes. When tested, they were able to do the task even when unfamiliar numbers of things were introduced. In other words, having learned that two was more than one and three more than two, they could also figure out that five was more than two, or eight more than six.

The pigeons had learned an abstract rule: peck images on a screen in order, lower numbers to higher. It may have taken a year of training, with different shapes, sizes and colors of items, always in groups of one, two or three, but all that work paid off when it was time for higher math.

Given groups of six and nine, they could pick, or peck, the images in the right order. This is one more bit of evidence of how smart birds really are.

No testing has been done with numbers greater than nine, so whether a pigeon can count large numbers of bread crumbs or popcorn kernels is a question still open to investigation.

Editorial Team

Upcoming events

Happy New Year to all Quantinuans

2012 having being declared as the 'National *Mathematical Year*', as a tribute to *mathematics* wizard Srinivasa Ramanujan by our Prime Minister Manmohan Singh, we kick off the celebrations with 'Quantinum Annual Day' on 14th January 2012. A celebration of mathematics, hosted by Quantinum-the quantitative and analytics club of K.J.Somaiya Institute of Management Studies & Research(SIMSR).



K. J. Somaiya Institute of Management Studies & Research



Quantinum-
The Quants Forum

Its all about NUMBERS...

Quantinum's Annual Day

28th JANUARY, 2012 from 2pm

EVENTS LINED UP!!!



Analytics Workshop



Quantiz Quiz



Guest Talk

Cash Prizes and
Certificate of
Participation

Venue:
Chankaya Building
KJ Somaiya Institute of
Management

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For further information please visit our website-<http://quantinum.weebly.com/>

Editorial Team



QUANT QUERY OF THE MONTH

QUANT TRIVIA

“Black holes result from God dividing the universe by zero ”

Sudoku of the Month

7			6	2			1
	6			5			4
	1	8		3		9	
	9			8			5
	5		9	7		4	
6			3				7
	8		5			3	1
4			1				2
1			2	6			7

Answers and name of solvers will be published in the next issue. Mail your answers to simsr.quantinum@gmail.com

Solution to last month's Sudoku of the month

7	1	6	5	9	3	4	2	8
5	3	4	8	2	1	7	6	9
2	8	9	7	6	4	5	1	3
8	2	1	4	3	5	6	9	7
9	6	3	1	7	2	8	4	5
4	7	5	9	8	6	2	3	1
3	5	7	2	4	9	1	8	6
6	4	8	3	1	7	9	5	2
1	9	2	6	5	8	3	7	4

No correct entry was received for last months Sudoku of the month.

Editorial team



SIMSR

Quantinum, the Quant's forum of KJ Somaiya Institute of Management Studies and Research is formed with two objectives. Firstly to remove the common myth from the students mind that mathematics is difficult. Secondly to give students an exposure on how to make decisions in real life business problems using quantitative techniques. This helps to bridge the gap between theory and the practical application.

For any further queries and feedback, please contact the following address

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