

# Pesquisa aplicada com o R: BETS package e Indicador de Incerteza da Economia (IIE-Br)

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# Outline

- ▶ Por que decidimos usar o R?

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- ▶ **BETS package**

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Por que decidimos usar o R?

## Por que decidimos usar o R?











## Por que o R é cada vez mais usado por *Data analysts* e Empresas?

- ▶ O R foi desenvolvido, especialmente por Analistas Estatísticos, o que significa que os códigos em R requerem poucas linhas de comando (logo, menos trabalho) que códigos escritos em java, Python ou C++;
- ▶ O R é um projeto "aberto", o que significa ser continuamente melhorado, atualizado e expandido pela comunidade global de desenvolvedores e usuários incrivelmente apaixonados.

David Smith, Chief Community Office, Revolution Analytics



# R #6 in IEEE 2015 Top Programming Languages, Rising 3 Places

Language Rank	Types	Spectrum Ranking
1. Java		100.0
2. C		99.9
3. C++		99.4
4. Python		96.5
5. C#		91.3
6. R		84.8
7. PHP		84.5
8. JavaScript		83.0
9. Ruby		76.2
10. Matlab		72.4

## IEEE Spectrum ranks

1. Google search rankings and trends
2. Social media chatter
3. GitHub and StackOverflow
4. Job opportunities
5. Academic citations

## Claro que o mais importante foi que o R resolveu o nosso problema

- ▶ **Gratuito** (burocracia para comprar pacote Matlab)
- ▶ **Pacotes econométricos/estatísticos:** Christoph Sax. seasonal: R Interface to X-13-ARIMA-SEATS, 2015b. URL <http://cran.r-project.org/package=seasonal>.
- ▶ **Rshiny**

## Indicador de Incerteza da Economia (IIE-Br)

Você pode achar que a incerteza é importante  
porque...

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OPINION | April 28, 2013, 5:47 p.m. ET

### Uncertainty Is the Enemy of Recovery

*At Vanguard, we estimate that policy uncertainty has created a \$261 billion drag on the U.S. economy.*

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By BILL MCNABB

Anyone hoping for signs of a healthy economic recovery was disappointed by lower-than-expected GDP growth for the first quarter of 2013 — a mere 2.6% for

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## The plague of economic uncertainty

August 19, 2012 4:52 pm by Gavyn Davies

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A mídia internacional e nacional está dando importância para o tema

The image shows a collage of two news websites. The top portion features the Wall Street Journal homepage from April 28, 2013. The main headline is "Uncertainty Is the Enemy of Recovery" by Gavyn Davies. Below it, there's a sub-headline "The plague of economic uncertainty" and a photo of Gavyn Davies. The bottom portion shows the Vox website with a similar article titled "How to make Europe's incipient recovery durable: End policy uncertainty" by Marco Buti and Pier Carlo Padoa-Schioppa, dated September 12, 2013. The article text on Vox reads: "The Eurozone is recovering but the revival is fragile – ringed by downside risks. This column argues that three steps – reducing policy uncertainty, repairing the financial system, and creating new investment opportunities – are essential. They could switch the negative confidence-growth feedback loop into a positive one, thus paving the way to robust medium-term growth. There is no room for complacency or procrastination."



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**Europe's incipient recovery policy uncertainty**

September 2013

revival is fragile – ringed by downside risks. This column argues that three repairing the financial system, and creating new investment opportunities – negative confidence-growth feedback loop into a positive one, thus paving

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Acirramento da crise política lança mais dúvidas sobre a capacidade de reação da economia brasileira

**The plague of economic uncertainty**  
August 19, 2012 4:52 pm by Gavyn Davis

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17 Março 2016 | 09h 00 - Atualizado: 17 Março 2016 | 09h 04

Para o presidente do maior banco privado do País, anos de decisões equivocadas dificultam a tarefa do governo de tirar o Brasil da recessão

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Pedro Costa Ferreira

Instituto Brasileiro de Economia (FGV|IBRE)

Ou, talvez, porque ....

# o Paul Krugman pense que esse não é um tema tão importante

The screenshot shows a New York Times blog page. At the top, there are navigation links: HOME PAGE, TODAY'S PAPER, VIDEO, MOST POPULAR, TIMES TOPICS. A search bar is present with the text "Search All NYTimes.com". Below the navigation is the header "The Opinion Pages" and a secondary navigation bar with categories: WORLD, U.S., NY, REGION, BUSINESS, TECHNOLOGY, SCIENCE, HEALTH, SPORTS, OPINION, ARTS, STYLE, TRAVEL, JOBS, REAL ESTATE, AUTOS.

The main content area features a profile picture of Paul Krugman and the title "The Conscience of a Liberal" by PAUL KRUGMAN. The date is "October 13, 2011, 8:52 AM" with "10 Comments". The sub-headline is "Varieties Of Uncertainty".

The text of the article begins: "Some of the usual suspects have lately been touting a research paper by Baker et al that supposedly shows that policy uncertainty is an important factor in restraining the economy, and claiming that this vindicates the Republican view. Larry Mishel [sets the record straight](#)."

The next paragraph states: "As Mishel points out, the first thing you need to know is that the index of uncertainty is based on a count of news stories. This means that if the Murdoch empire decides to push the line that there's a lot of policy uncertainty, the authors' index measures this as a real rise in uncertainty, not as the propaganda campaign it is."

The final paragraph starts: "But even setting that aside, what the paper measures as 'uncertainty' isn't at all what the right wants you to think is driving events. Health reform does not visibly move their index; what really sent it sky-high was the debt ceiling dispute. So you could argue that the real policy uncertainty here isn't fear of that socialist Islamic atheist in the White House; it's fear of Republican hostage-taking. That, at any rate, comes closer to what seems to be going on in

On the right side of the page, there is a "Search This Blog" box, a "Previous Post" link to "Legends Of The Fall (Of 2008)", a "Next Post" link to "Low Rates As A Sign Of Failure", and social media follow buttons for Twitter and RSS. Below that is an "ABOUT PAUL KRUGMAN" section with a bio and a list of his books: "End This Depression Now! (2012)", "Principles of Economics, 2nd ed. (2008)", "The Return of Depression Economics and the Crisis of 2008 (Dec. 2008)", and "The Conscience of a Liberal (Oct. 2007)".

At the bottom, there is an advertisement for "fitness Singles" featuring a woman in a blue tank top and a red background with the text "fitness Singles Meet Running".

# o Paul Krugman pense que esse não é um tema tão importante

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**The Conscience of a Liberal**

PAUL KRUGMAN



October 13, 2011, 8:52 AM | 10 Comments

## Varieties Of Uncertainty

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**The Conscience of a Liberal**

PAUL KRUGMAN



## Culture Of Fraud

Still on vacation, but I have internet access for a bit, and have checked in on a few matters. The big story of the week among the dismal science set is the Romney campaign's [white paper on economic policy](#), which represents a concerted effort by these economists – Glenn Hubbard, Greg Mankiw, and John Taylor – to destroy their own reputations. (Yes, there was a fourth author, Kevin Hassett. But the co-author of "Dow 36,000" doesn't exactly have a reputation to destroy).

And when I talk about destroying reputations, I don't just mean saying things I disagree with. I mean flat-out, undeniable professional malpractice. It's one thing to make shaky or even desecrately wrong arguments. It's something



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ABOUT PAUL KRUGMAN

Paul Krugman is an Op-Ed columnist for The New York Times.

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o Paul Krugman pense que esse não é um tema tão importante

The screenshot displays the New York Times website with the 'The Opinion Pages' blog. The main article is 'The Conscience of a Liberal' by Paul Krugman, dated October 13, 2011. The article's sub-header is 'Varieties Of Uncertainty'. The text begins with 'Some of the usual suspects have lately been touting a research paper by Baker et al that supposedly shows that policy uncertainty is an important factor in restraining the economy, and claiming the view: Larry Mishel sets the record straight.' A second paragraph starts with 'As Mishel points out, the first thing you see in uncertainty is based on a count of news at Murdoch empire decides to push the line uncertainty, the authors' index measures as the propaganda campaign it is.' A third paragraph starts with 'But even setting that aside, what the page all what the right wants you to think is devilishly move their index; what really sent dispute. So you could argue that the real that socialist Islamic atheist in the White hostage-taking. That, at any rate, comes c'.

The page also features a sidebar with a search bar, navigation links (HOME PAGE, TODAY'S PAPER, VIDEO, MOST POPULAR, TIMES TOPICS), and a subscription link. The article title 'The Conscience of a Liberal' is repeated in a smaller font at the bottom of the page.

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**Varieties Of Uncertainty**

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But even setting that aside, what the paper does is to show that the right way to think is to do is to move their index; what really sent the dispute. So you could argue that the real issue is that socialist Islamic atheist in the White House is taking. That, at any rate, comes c

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ABOUT PAUL KRUGMAN

Paul Krugman is an Op-Ed columnist and author of the book "The Conscience of a Liberal".

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**The Conscience of a Liberal**

PAUL KRUGMAN

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**Asymmetrical "Uncertainty"**

Ever since it came out, Obama-bashers have loved Mishel, and Boris-claiming that policy uncertainty is an important factor in restraining the economy. Now, they say, it's Obama and his socialist atheist in the White House is taking. That, at any rate, comes c

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October 22, 2009, 1:18 PM

**The "Uncertainty" Scam**

One of the central talking points of right-wing economists is that "uncertainty" caused by Obama is holding the economy back; they cite, again and again, a paper by Bloom et al purporting to find a relationship between uncertainty and jobs, with uncertainty measured by such things as article counts.

But what's driving that uncertainty index? Jan Hatzius and his team at Goldman have an analysis, cited by EY AlphaSite, pointing out something that I thought I knew, but with much more clarity: it's not at all about Obama.

Here's my key graph from the Hatzius paper:

**Exhibit 2: Is Policy Uncertainty Cause or Effect of the Weak Economy?**

Percentage points

Scale

20  
10  
0  
-10  
-20  
-30  
-40  
-50  
-60  
-70  
-80  
-90  
-100

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009

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An Issue Where Times Has Failed

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ABOUT PAUL KRUGMAN

Paul Krugman is an Op-Ed columnist for The New York Times.

- Biography
- Columns
- Books

Did This Depression Hurt (2012)  
Principles of Economics, 2nd ed. (2009)  
The Return of Depression Economics and the Crisis of 2008 (2009)  
The Conscience of a Liberal (Oct. 2007)

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Outline  
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O que é o Indicador de Incerteza da Economia – Brasil (IIE-Br)  
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IIE-Br e outras variáveis

o Paul Krugman pense que esse não é um tema tão importante

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**The Conscience of a Liberal**

PAUL KRUGMAN

August 6, 2013, 10:42 am | 149 Comments

**Another Bad Story Bites The Dust**

One of the remarkable things about the ongoing economic crisis is the endless

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The Year of Living Stupidly

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The screenshot displays the New York Times website interface. At the top, navigation links include HOME PAGE, TODAY'S PAPER, VIDEO, MOST POPULAR, and TIMES TOPICS. The main header features the newspaper's name and a search bar. Below the header, a secondary navigation bar lists various sections: WORLD, U.S., NY/REGION, BUSINESS, TECHNOLOGY, SCIENCE, HEALTH, SPORTS, OPINION, ARTS, STYLE, TRAVEL, JOBS, REAL ESTATE, and AUTOS. The main content area is dominated by the article "The Conscience of a Liberal" by Paul Krugman, dated September 12, 2013. The article's title is prominently displayed, followed by the author's name and a small portrait. The text begins with "One of the distinguishing features of economic discourse since 2008 has been the remarkably destructive role played by most, though not all, international technocrats..." To the right of the article, there is a sidebar with a search bar for the blog and a list of recent posts, including "Toxic Inequality" and "Good Times at the Top". At the bottom of the page, there are additional navigation and subscription options.

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The screenshot shows the New York Times website interface. At the top, there are navigation links for 'HOME PAGE', 'TODAY'S PAPER', 'VIDEO', 'MOST POPULAR', and 'TIMES TOPICS'. Below this is the 'The Opinion Pages' header with a search bar and a 'Subscribe: Digital / Home Delivery' link. A horizontal menu lists various categories: 'WORLD', 'U.S.', 'N.Y./REGION', 'BUSINESS', 'TECHNOLOGY', 'SCIENCE', 'HEALTH', 'SPORTS', 'OPINION', 'ARTS', 'STYLE', 'TRAVEL', 'JOBS', 'REAL ESTATE', and 'AUTOS'. The main content area features a search bar and a 'SUBSCRIBE NOW' button. Below the search bar, there is a navigation bar with 'HOME PAGE', 'TODAY'S PAPER', 'VIDEO', 'MOST POPULAR', and 'U.S. Edition'. The article title 'The Conscience of a Liberal' by Paul Krugman is displayed, along with a small profile picture of the author. The article's publication date is 'October 1, 2013, 7:36 pm' and it has '146 Comments'. The article title is 'What They Say Versus What They Mean'. To the right of the article, there is a 'Search This Blog' bar and a list of 'Previous Post' and 'Next Post' links. At the bottom of the article, there are links for 'FOLLOW THIS BLOG' and 'RSS'.

## O que diz a literatura internacional ...

- ▶ Incerteza está associada a inabilidade das pessoas em prever a probabilidade associada a certos eventos (Frank Knight (1921));
- ▶ A incerteza afeta diretamente o crescimento da economia e reduz investimentos, contratações, consumo e comércio;
- ▶ A incerteza é maior em países em desenvolvimento
  - ▶ Setor industrial mais concentrado;
  - ▶ Mais dependentes de commodities;
  - ▶ Mais suscetíveis a desastres naturais.

## O que diz a literatura internacional ...

- ▶ firms may, when facing increased uncertainty, prefer to wait-and-see rather than to engage in partially irreversible investment activities which with hindsight might turn out to have been wrong (Bernanke (1983));

The Quarterly Journal of Economics - Vol. 98, No. 1, Feb., 1983 - Irreversibility, Unc...



**Irreversibility, Uncertainty, and Cyclical Investment**

Ben S. Bernanke  
The Quarterly Journal of Economics  
Vol. 98, No. 1 (Feb., 1983), pp. 95-106  
Published by [Oxford University Press](http://www.jstor.org/stable/1885528)  
Stable URL: <http://www.jstor.org/stable/1885528>  
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Viewing page 95 of pages 95-106

**IRREVERSIBILITY, UNCERTAINTY, AND CYCLICAL INVESTMENT\***

**BEN S. BERNANKE**

This paper builds on the theory of irreversible choice under uncertainty to give an explanation of cyclical investment fluctuations. The key observation is that, when individual projects are irreversible, agents must make investment timing decisions that trade off the extra returns from early commitment against the benefits of increased information gained by waiting. In an environment in which the underlying stochastic structure is itself subject to random change, events whose long-run implications are uncertain can create an investment cycle by temporarily increasing the returns to waiting for information.

Navigation icons: back, forward, search, etc.

## O que é o Indicador de Incerteza da Economia – Brasil (IIE-Br)

- ▶ É uma medida proxy do grau de incerteza econômica do país ao longo do tempo;
- ▶ O IIE-Br é composto por 3 medidas de incerteza:
  - ▶ **IIE-Br-Mídia**: baseado na “frequência de notícias relacionadas a incerteza econômica nos principais jornais do país”
  - ▶ **IIE-Br-Expectativa**: baseado no “grau de dispersão nas expectativas de mercado, calculadas pelo Banco Central e pesquisas de sondagem, calculados pela FGV”
  - ▶ **IIE-Br-Mercado**: baseado na “volatilidade do mercado e prêmio do Credit Default Swap”.

## O IIE-Br-Mídia

### Definição

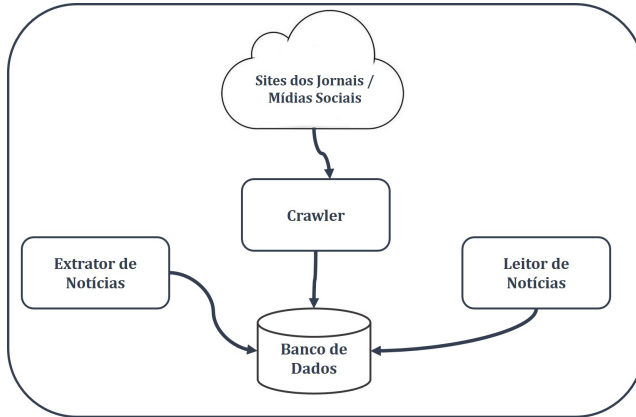
Medida de **incerteza** baseada nas publicações dos principais jornais do país. Para ser calculado, ele leva em conta a **frequência** de notícias contendo determinados **termos**, que remetem a incerteza econômica.

### Trabalhos Relacionados

- ▶ Scott R Baker, Nicholas Bloom, and Steven J Davis. **Measuring economic policy uncertainty**. Chicago Booth research paper, (13-02), 2015.
- ▶ M. Alexopoulos and J. Cohen. **Uncertain times, uncertain measures**. Working Paper 352, 2009.
- ▶ Adonias Evaristo da Costa Filho. **Incerteza e atividade econômica no brasil**. Economia Aplicada, 18 (3):421-453, 2014.



## Etapas



## R for All

### Captura

- RSelenium
- Rvest
- RCurl
- boilepipeR

### Banco de Dados

- RSQLite
- DBI

### Manipulação de Textos

- stringeR

## O IIE-Br Expectativa

O IIE-Br- Expectativa é um indicador que objetiva calcular o grau de **dispersão** nas expectativas de mercado do **Boletim Focus**, geradas pelo Banco Central e pesquisas das **Sondagem Empresariais**, calculadas pela FGV-IBRE

## Trabalhos Relacionados

- ▶ **Scott R Baker, Nicholas Bloom, and Steven J Davis.** Measuring economic policy uncertainty. Chicago Booth research paper, (13-02), 2015.
- ▶ **Rudiger Bachmann, Steffen Elstner, and Eric R Sim.** Uncertainty and economic activity: Evidence from business survey data Technical report, National Bureau of Economic Research, 2010.

## Fontes de Dados

- ▶ Expectativas do Banco Central
- ▶ Sondagens Empresariais  
-IBRE/FGV

## Etapas de Cálculo

1. Coleta\Extração dos dados
2. Cálculo da Série Histórica
3. visualização dos dados

## R for All

### Captura

- RSelenium
- tidyr

### Vizualização

- dygraphs

### Cálculo da Série Histórica

- zoo
- xlsx
- RDS

## O IIE-Br Mercado

O IIE-Br-Mercado visa mensurar variabilidade do mercado acionário Brasileiro e seu grau de risco, ou seja, diferente IIE-Br-expectativa busca mensurar a variabilidade do sentimento do mercado no tempopresente.

## Trabalhos Relacionados

- ▶ **Scott R Baker, Nicholas Bloom, and Steven J Davis.** Measuring economic policy uncertainty. Chicago Booth research paper, (13-02), 2015.
- ▶ Chicago Board Options Exchange. **The cboe volatility index-vix.** White Paper, pages 1-23,2014.

## Fontes de Dados

- ▶ *Credit Default Swap* - Prêmio Cinco Anos
- ▶ Série diária do IBOVESPA

## Etapas de Cálculo

1. Coleta\Extração dos dados
2. Cálculo da Série Histórica
3. visualização dos dados

## R for All

### Captura

- quantmod

### Vizualização

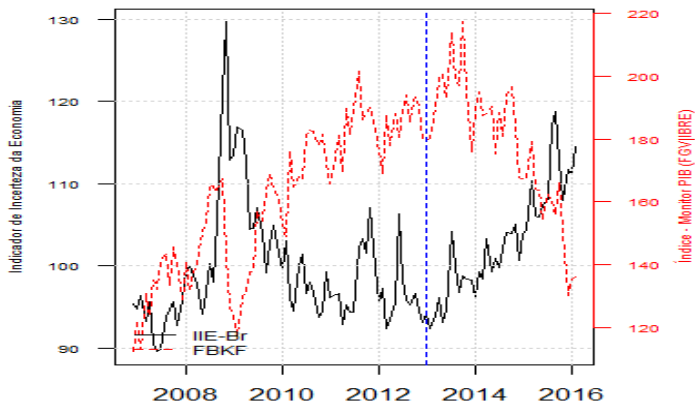
- dygraphs

### Cálculo da Série Histórica

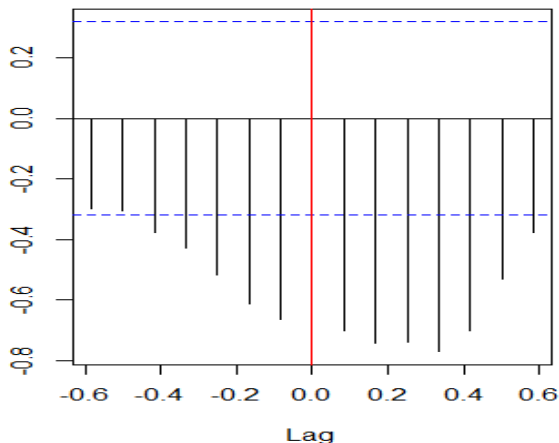
- zoo
- dplyr
- xlsx



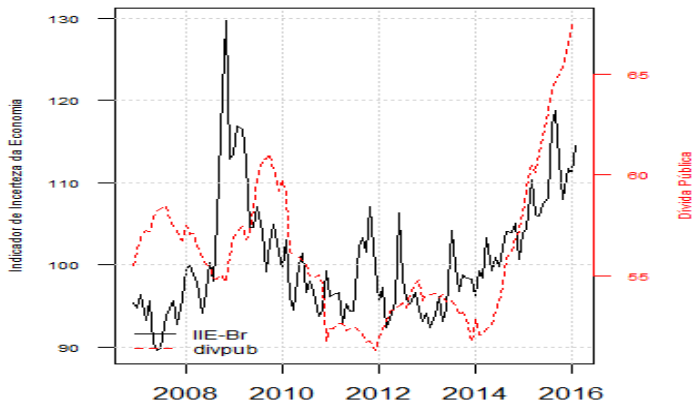
## Parece que a incerteza realmente afeta investimento



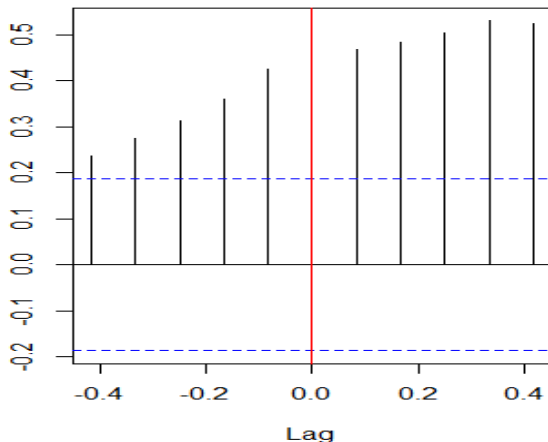
Parece que a incerteza realmente afeta investimento



Parece que o aumento da dívida bruta causa um pouco de incerteza

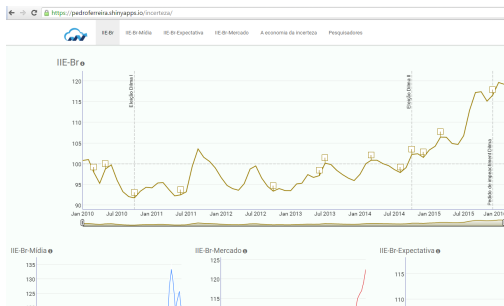


Parece que o aumento da dívida bruta causa um pouco de incerteza



## RShiny - App de Incerteza

- ▶ RShiny - App de Incerteza disponível em:  
<https://pedroferreira.shinyapps.io/incerteza/>;



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**BETS package**  
Por que o BETS é importante?  
Instale agora mesmo  
Um pouco do BETS ...  
O IIE-Br está no BETS

## BETS package

## Brazilian Economic Time Series (BETS)

- ▶ O **BETS** package fornece informações sobre as mais importantes séries temporais econômicas do Brasil, produzidas por três importantes centros:
  - ▶ Banco Central do Brasil (BCB)
  - ▶ Instituto Brasileiro de Geografia e Estatísticas (IBGE)
  - ▶ Instituto Brasileiro de Economia (FGV|IBRE)
  
- ▶ São mais de 15.000 séries temporais livres em frequências diárias, mensais e anuais;

## Brazilian Economic Time Series (BETS)

- ▶ Além das séries temporais livres divulgadas por esses três institutos, estão disponibilizadas nesse pacote mais de 16.000 séries temporais pagas produzidas pelo Instituto Brasileiro de Economia (FGV|IBRE) com defasagem de seis meses, perfazendo um total de mais de 31.000 séries temporais no pacote;
- ▶ Além do acesso a esse imenso banco de dados, o pacote permite que o usuário pesquise e interaja com o banco de dados de maneira fácil e amigável, por exemplo, procurando por uma série temporal por palavras-chave;



## Brazilian Economic Time Series (BETS)

- ▶ Permite também a instalação automática de importantes pacotes de análise de séries temporais, permitindo uma análise profunda das séries sem ter que se preocupar com a instalação de outros pacotes;
- ▶ E a publicação de exercícios estatísticos/econométricos que permitirão aos usuários entender melhor o comportamento das séries temporais brasileiras, como por exemplo, exercícios de ajuste sazonal.

## Por que o BETS é importante ???

- ▶ É uma tendência mundial a "liberação" de ST (e.g. Federal Reserve (API), World Development Bank (API e pacote));
- ▶ Facilita o contato do pesquisador com as mais diversas ST econômicas produzidas no Brasil;
- ▶ Permite que pessoas do mundo inteiro utilizem as ST econômicas do Brasil em suas pesquisas.

## Instale agora mesmo

```
require(devtools)  
install_github("pedrocostaferreira/BETS")  
require(BETS)
```

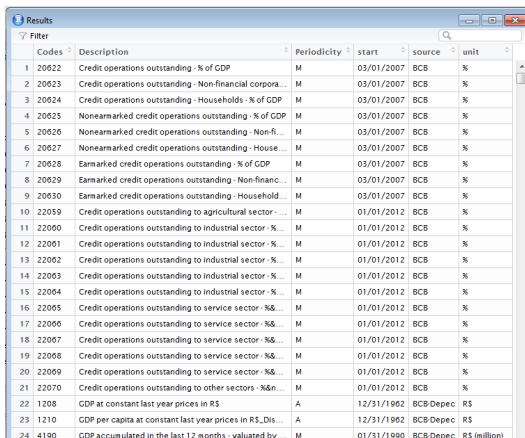
### Package ‘BETS’

April 25, 2016

**Type** Package  
**Title** Brazilian Economic Time Series  
**Version** 0.0.1  
**Date** 2016-02-02  
**Depends** R (>= 3.2.0)  
**Imports** ggplot2, urca, TTR, forecast, TSA, FinTS, fpp, stringi, sqldf, foreign, lmtest, normtest, zoo  
**Author** Paulo Picchetti <paulo.picchetti@fgv.br> and Pedro Costa Ferreira  
<pedro.guilherme@fgv.br> and Daiane Mattos <daiane.mattos@fgv.br> and Jonatha  
Costa <jonatha.costa@fgv.br> and Rodrigo Alves <rodrigo.alves@fgv.br>  
**Maintainer** Pedro Costa Ferreira <pedro.guilherme@fgv.br> and Daiane Mattos  
<daimattos@gmail.com> and jonatha Costa <jonatha.costa@fgv.br> and Rodrigo  
Alves <rodrigo.alves@fgv.br>

## Um pouco do BETS ...

BETSsearch(name = "gdp")

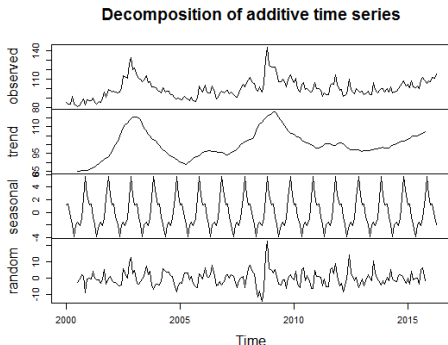


The screenshot shows a window titled "Results" with a search filter. The table contains the following data:

Codes	Description	Periodicity	start	source	unit
1 20622	Credit operations outstanding - % of GDP	M	03/01/2007	BCB	%
2 20623	Credit operations outstanding - Non-financial corpora...	M	03/01/2007	BCB	%
3 20624	Credit operations outstanding - Households - % of GDP	M	03/01/2007	BCB	%
4 20625	Nonearmarked credit operations outstanding - % of GDP	M	03/01/2007	BCB	%
5 20626	Nonearmarked credit operations outstanding - Non-fi...	M	03/01/2007	BCB	%
6 20627	Nonearmarked credit operations outstanding - House...	M	03/01/2007	BCB	%
7 20628	Earmarked credit operations outstanding - % of GDP	M	03/01/2007	BCB	%
8 20629	Earmarked credit operations outstanding - Non-financ...	M	03/01/2007	BCB	%
9 20630	Earmarked credit operations outstanding - Household...	M	03/01/2007	BCB	%
10 22059	Credit operations outstanding to agricultural sector - ...	M	01/01/2012	BCB	%
11 22000	Credit operations outstanding to industrial sector - %...	M	01/01/2012	BCB	%
12 22001	Credit operations outstanding to industrial sector - %...	M	01/01/2012	BCB	%
13 22002	Credit operations outstanding to industrial sector - %...	M	01/01/2012	BCB	%
14 22003	Credit operations outstanding to industrial sector - %...	M	01/01/2012	BCB	%
15 22004	Credit operations outstanding to industrial sector - %...	M	01/01/2012	BCB	%
16 22005	Credit operations outstanding to service sector - %&...	M	01/01/2012	BCB	%
17 22006	Credit operations outstanding to service sector - %&...	M	01/01/2012	BCB	%
18 22007	Credit operations outstanding to service sector - %&...	M	01/01/2012	BCB	%
19 22008	Credit operations outstanding to service sector - %&...	M	01/01/2012	BCB	%
20 22009	Credit operations outstanding to service sector - %&...	M	01/01/2012	BCB	%
21 22070	Credit operations outstanding to other sectors - %&n...	M	01/01/2012	BCB	%
22 1208	GDP at constant last year prices in R\$	A	12/31/1962	BCB-Depec	R\$
23 1210	GDP per capita at constant last year prices in R\$,Dis...	A	12/31/1962	BCB-Depec	R\$
24 4190	GDP accumulated in the last 12 months - valued by ...	M	01/31/1990	BCB-Depec	R\$ (million)

## O IIE-Br está no BETS : ))

```
IIE_Br <- BETSget("100.0")  
plot(decompose(IIE_Br))
```



## Comentários finais

- ▶ RShiny - App de Séries Temporais disponível em:  
<https://pedroferreira.shinyapps.io/SeriesTemporais/>;
- ▶ **Livro:** Análise de Séries Temporais em R: um curso introdutório
- ▶ Textos para discussão NMEC disponíveis em [FGV|IBRE](#)

