

# FRED USABILITY ENHANCEMENT PROJECT

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## FRED Usability Enhancement Project

The Federal Reserve Bank of St. Louis, recognizing the need for increased usability on the Federal Reserve Economic Data (FRED) website, initiated the FRED Usability Enhancement Project in September 2017. The project necessitated the hiring of a Usability Specialist to **“collect data, facilitate focus groups and conduct market research to determine what barriers, problems and issues users of FRED encounter.”**

The end results of this process, as defined in the contract, are **“data regarding results, market research, a written analysis of the barriers, problems, and issues, and suggested solutions.”** This report contains each of these agreed-upon deliverables, as well as an implementation plan, an assessment plan, and descriptions of how suggested solutions may be visually designed into the FRED website.

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## Methodology

A mix of methodologies were used to collect data for this project.

### Quantitative Observation Sessions

3 observation studies were conducted with the *College Professor* persona group. They were selected as the main group for this project as it has the most “bang for the buck” in terms of outreach to the larger *College Student* persona group, and is the easiest to engage. The observation sessions were held as though the professors were students, with FRED team members conducting training sessions. Professors were asked to follow each step.

1 *College Student* observation session was conducted with students completing actual coursework. They had already been introduced to FRED and did not follow the same training session.

Observation Sessions:

- September 29, 2017 at Santa Monica Community College (20 participants)
- October 23, 2017 at LaGuardia Community College (19 participants)
- November 10, 2017 at Lorain County Community College (16 participants)
- December 4, 2017 at Illinois Wesleyan University (13 participants)

Data Collection:

- Walk-around observations with note taking and discussion
- One on one conversations

Data points:

- “Incorrect” clicks when following discrete instructions
- What users click when determining action based on description of desired outcome
- Success rate of finding described feature at all
- Number of “incorrect” clicks before achieving desired outcome
- Number and category of questions from participants

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## Qualitative Discussion Sessions

Two discussion sessions were held, one with the *College Professor* persona group and the other with the Product Team. These conversations allowed stakeholders to discuss in an informal setting what they saw as usability issues with FRED. The professor focus group had a 4-part questionnaire and open discussion time, while the product team meetings were general information gathering and frustration venting sessions.

Discussion Sessions:

- November 2, 2017 Focus Group at Professors Conference, St. Louis (6 participants)
- November 3, 2017 Product Team Meetings at STL Fed Office

Data Collection:

- Responses to questionnaire
- Notes from discussions

Data Points:

- Examples of difficulty achieving goals
- List of hidden/unknown features
- Requested features/changes

## Market Research

Market research is used in this report to confirm that solutions to issues adhere to best practices and that solutions have proven positive outcomes in other case studies.

## Website Analytics

Google Analytics (GA) was referenced in conversations with product teams. However, changes to how GA is used, uneven implementation of tagging, and complications within GA reporting resulted in an inability to add meaningful data into this report. Suggestions for enhancing website analytics are in the implementation and assessment plan.

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## Findings

Analysis of both quantitative and qualitative data show that there are both distinct **usability issues** that can be solved through technical development and feature marketing/documentation, and **areas for enhancement** that should increase usability and user engagement with FRED.

Observed usability issues are pulled from Appendix B and are prioritized from **1** to **3**, with 3 being the highest, by the average of the number of users experiencing the issue in the quantitative observation sessions. Issues with scores less than 1 are left out of this report but available in the appendix. If an issue was preemptively explained by training session staff, that session does not factor into the average. Issues are further given a **+** symbol for priority emphasis if they were brought up during qualitative discussions. The student observation session is tabulated only if the action was repeated in the class.

Areas for enhancement are generated from Appendix A, B, and C, as well as analysis of the website against comparable products in the market and usability analysis considering best practices in the field.

## Usability Issues

### General

FRED is a powerful resource with an enormous user base. The cornucopia of features and information is what makes FRED robust but also creates a sense of **overwhelm**. Each page displays a lot of information. Observations and discussions show that users **cannot quickly find what is relevant to their needs** and **do not read anything beyond what they are originally seeking**. Series pages are the most visited and are the location of data manipulation and learning. Despite basing most of this project on the *College Professors* persona, where one would assume some advanced economics knowledge, **editing graphs requires a level of functional economic knowledge** (particularly formulas for creating new information from graphs) beyond the capabilities of many participants.

The FRED team has implemented numerous features over the lifetime of the product, to the point that there may be **feature glut**. Many features were cited as very important by the FRED team, but they were generally **unknown to participants**, even if they have used FRED extensively. Additionally, **features are often displayed in multiple places**, and may even function slightly differently in those different locations, adding to the confusion.

**13 usability issues have been identified** as important based on the rubric, and have been categorized into three sections of the website: the **series, dashboard, and search results pages**.

### Series Page

The series page is where most interaction takes place. Users can be walked through a demonstration and then feel comfortable playing around on their own, but do not know what to do in terms of any in-depth analysis without discrete instructions. **Very few users ever scroll “beyond the fold”** and focus just on the graph. A lot of important information is found below the fold, but there is **so much text that users glaze over** when viewing.

Series Page: Observed Issues	Ranking
1. Users are confused by legend's Frequency information: top of the graph will say "monthly" as frequency that the data comes out, but when users are modifying the data to show another unit they expect this legend to change.	1.5
2. Users are not finding the 1 yr/5yr/10yr date range at top of graph and when prompted, they are confused by what it does and do not realize it is X years from current date.	1.5
3. Save graph does not show you the observation range option unless you happen to be looking at the latest data, users confused by different views	1.5 +
4. In the Edit Panel, "Modify frequency" to annual is the same same as "from year ago". Having two ways to do the same thing is confusing and makes the page busier.	1.3
5. For zooming date range on the graph some people are stuck in the side panel, not realizing they can touch the graph while the panel is open.	1
6. Graph X axis does not show "now" point so users think data ends before it does in certain views, such as 5 year on a series that has monthly data	1

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## Dashboard & Saved Graphs

The “My Account” section is newer and used by a very small portion of overall users, even within the surveyed communities. The **value is hard to prove to new users**, and issues here were experienced at a much higher rate than in other sections of the usability study. However, the few power users who pushed through confusion found **dashboards useful for organizing coursework**. Users expressed the wish for a list of FRED team-curated dashboards for use in their classes to help them dive in.

Dashboard & Saved Graphs: Observed Issues	Ranking
Users do not understand what a dashboard is, and assume it is where saved graphs and other features will be.	3
Saved graphs: people cannot find search bar	2.6
Clicking on graph opens image view, users expect to get to graph. instead have to click small corner link that takes them a while to find. Repeat “incorrect” action many times.	2.6 +
Users trying to edit graphs like they would in "saved graphs" section	2.3
Users expect to be able to download from dashboard. Want same functionality as modified series page.	1.3

## Search Results

Many issues with the search results page were identified by the FRED team, the focus group, and a review against usability standards and best practices. However, the **nature of the observation session (being told exactly what to search for) meant that few issues were observed** during the sessions. Broader issues regarding search are in the qualitative comments in the Enhancement Areas section.

Search Results	Ranking
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Users clicking on checkboxes instead of titles when trying to get to series page	1.5 +
Users are unaware that a series is within a table that may be of use to them	1.5 +
Users are not finding the desired series	1.3 +

## Enhancement Areas

In addition to the specific observed issues in the previous section, areas for enhancement were discovered through observation sessions, the focus group conversation, discussion with the FRED product team, and critical review of the FRED website against best practices in user experience design and competitor products.

### User Interface Design

The FRED UI, while consistently branded and instantly recognizable, could use some updates to current design standards. This will not require a full redesign but should be done in consultation with a User Interface designer to create wireframes and design prototypes. The following issues were found:

- Large blocks of small print text
- Unused blank spaces combined with scrolling for information
- Large number of links next to each other
- Poor heading titles
- Dropdowns with too few items to require a drop down menu
- Repeated use of square shape for different pieces of content
- Tabbed navigation within content
- Repeated content in multiple places making pages busier

**Screenshots of these issues can be found in Appendix E**, with red circles highlighting problem areas.



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## Training Sessions

The FRED ambassadors have done a great job getting the product out into the hands of the *College Professor* persona. In my observations, these “students” were generally engaged and seemed likely to at least interact with FRED again, if not commit to using it in their classrooms. A few areas for trainer improvement were observed:

- In an attempt to get through large breadth of material in one day, **trainers do not fully explain exercises before diving in**, so trainees are blindly following steps rather than critically thinking about the action they are trying to accomplish
- Aware of the usability issues of the site, **trainers lead users through issues rather than letting users struggle/fail/ask questions**. While this helps users accomplish tasks and keep class flow, they are unlikely to remember odd workarounds and will encounter the issue later and be lost. Here, a usability maxim is helpful to keep in mind: **if the process is not intuitive, users will fail at completing tasks**.
- **Too many different products are being taught in one session**. FRED, GeoFRED, FREDCast, and EconLowdown are all introduced, with the latter rushed through due to time constraints. The imprint of the features taught in FRED are muddied by introduction of other products.

## Product & Feature Integration

The Research Division of the St. Louis Federal Reserve Bank has invested great time and resources into creating products to promote economic education. However, **users are not aware of different products** and they are not prominently displayed on the various Federal Reserve Bank of St. Louis websites. The following products and features need to be highlighted and integrated more successfully:

- GeoFRED
- EconLowDown
- Release Calendar
- RSS feed for series updates

Ideas for how to integrate these products and features are in the Suggestions section.

## Search

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The search functionality and search results page are known issues to the FRED team. The vast number of resources and the **multiplicity of sources with their own idiosyncratic naming conventions** makes it difficult for the FRED team to display the most relevant search results for human-language searches. The team has worked diligently on tagging series and adding filters, writing algorithms for relevance rank, and creating human-language alternative search terms. The search results page is one area where **deep consideration should go into what data is displayed and what functionality is allowed.**

This is a complex issue that many libraries and government organizations deal with in serving up large amounts of data, and **solutions may be resource intensive and hard to assess.** With that in mind, here are some observed issues:

- **Titles of series** are hard to type correctly, search through, or understand
- Far too many **filters** on left side bar, making users eyes glaze over
- **Checkboxes** on the left of titles make users click them to get to series
- Hierarchical **top series link** is opaque, not sure what it links to
- **Source** is not listed, so similarly named series are indistinguishable
- **Popularity bar** does not indicate to users how it is calculated or how to use it
- If users want to **add multiple series to a graph from search page** (as feature leads them to do), they can only do so with two series that end up in the same page of results

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## Solutions, Suggestions, & Recommendations

The following section has been written by combining quantitative analysis, qualitative conversations, reviewing best practices for usability, considering user personas, and listening to team input about workload and feasibility.

### Solutions for Usability Issues

Development solutions were created with FRED team input through in-person brainstorming sessions. Solutions are scored by *priority of issue* divided by *difficulty of solution*. Priority of issue is calculated by the above section's **observation ranking, +.5 for correction of deviance from usability standards, and +.5 if the issue was raised in discussions**. Difficulty of solution was assigned by the development team.

Scale is from  $\frac{1}{3}$  to 3, with  $\frac{1}{3}$  being worst score (low priority issue with high workload solution) and 3 being a slam dunk (high priority issue with easy solution). **Only solutions scores of "1" or higher are considered viable.**

Priority of Issue:	1 1 1	2 2 2	3 3 3
	-- -- --	-- -- --	-- -- --
Difficulty of Solution:	1 2 3	1 2 3	1 2 3

#### Series Page

**Issue 1:** Users are confused by legend's frequency information.

**Solution:** Change phrasing between the graph and the description underneath. Potential phrases include "Raw Data", "Base", "Original" and "Source".

**Score: 1.5**

**Issue 2:** Users are not finding, or confused by, 1/5/10 yr date option.

**Solution:** Add label "last" or "past", understanding that financial pros are more comfortable with this feature than the personas of this study.

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**Score: 1.5**

**Issue 3:** Save graph does not always show the observation range option .

**Solution:** For consistency, have the same options on all “save graph” modals. Simplify wording to help users understand that options: this date range, this chunk of time forward, or from selected start range to current date.

**Score: 2**

**Issue 4:** In Edit Panel, “Modify frequency” to annual is the same same as “from year ago”.

**Solution:** Create alert to notify users that the selections provide the same result.

**Score: 1.3**

**Issue 5:** Some users do not understand they can manipulate graph while panel is open.

**Solution:** Remove left shadow from Edit Panel and add shadow or frame to blue box to make it more pronounced. This issue is generally found with older participants, and I suggest testing the effect of the simple CSS solution before implementing more intensive responsive design solutions.

**Score: 1**

**Issue 6:** Graph X axis does not show "now" point, users sometimes think data ends earlier

**Solution:** Two simple solutions are offered here; either add a start/end tick mark on the axis or turn the white space that was once present back on.

**Score: 1**

## Dashboard & Saved Graphs

**Issue 1:** Users do not understand the “dashboard” term.

**Solution:** Have a team meeting to approve or modify new phrase “topic board” and one or two more options, then ask high value users to validate the phrase. Implement new phrase on front end.

**Score: 2**

**Issue 2:** Users cannot find search bar in Saved Graphs.

**Solution:** Add helper text “search content” or similar to search bar. This will have to be

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implemented in Version 2 of My Accounts. Only implement in current version if the fix is as simple as Version 2.

**Score: 2.6**

**Issue 3:** In Dashboard, users expect to go to graph on click, but instead get image view.

**Solution:** Create modal popup with two options: “View on FRED” or “View Enlarged”, track for a set period of time which is the preferred choice, then implement a hover with two icons, where click goes to the more common desired outcome.

**Score: 2**

**Issue 4:** In Dashboard, users are trying to edit graphs (info?) like in Saved Graphs section.

**Solution:** Issue may be a response to specific trainer requests that do not come up in natural use of FRED, but team will consider widgets and how they are titled and edited within the new conception of a dashboard.

**Score: N/A**

**Issue 5:** Users expect Series page functionalities in Dashboard.

**Solution:** This may be a result of the misuse of the term “dashboard” and the expectation for dashboard-like functionality on what are really more “topic boards”. Once terminology change has been implemented, ask trainers to continue to monitor observation of this problem to see if another solution is needed.

**Score: 1.3**

## Search Results

**Issue 1:** Users click on checkboxes instead of titles to open a series page.

**Solution:** Redesign page, creating a column for checkboxes on the right with “add to” heading with datalist and graph button options.

**Score: 1.6**

**Issue 2:** Users are not finding desired series.

**Solution:** Implement three changes and test user satisfaction. 1. Add in source information (creating a new grouping for each result by source). 2. Redesign filters to increase chance of use. In the “View All” section, display the number of filters related to the tag. For Geographies, create auto-fill drop downs to break up the wall of text. Break out Concepts

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into more discrete categories based on search terms. 3. Create marketing campaigns for complex features of Search like negation.

**Score: 1+** Note: enhancing relevant search results is an ongoing project and should be iterated upon and assessed regularly. The score is low but the work is known to be valuable and necessary by the FRED tea, and so was given a +.

**Issue 3:** Users do not know series may be within releases that may have useful datasets.

**Solution:** Create a column in the Notes section to display the series table in a small window, showing a few rows on either side of the selected series, with a vertical scroll. Decide functionality within the release table on click.

**Score: 1.5**

## Suggestions for Enhancement Areas

The following suggestions will help enhance the overall experience users have when interacting with FRED and its related products. Implementing these suggestions will help the user **successfully complete tasks, introduce features, products, and series**, increase both participants' and the FRED team's **product learning outcomes** during training sessions, and focus the team's ongoing and deep investigations into how to **better surface and display massive amounts of data** in search results.

### User Interface Design

The FRED user interface could benefit from a complete **UI review process**. While the branding is strong, there is too much content on each page for users to ingest. The UI review should include a **check for repeated features, content, and links**, determining where the appropriate place for the feature or link should be and **removing repetition**. If a feature is repeated across different pages, make sure it has the same functionality in each location. Additionally, the review should **check for hidden information and functions** behind tabs (homepage) or drop downs (series page account tools and share links) and **make this content visible**.

A primary UI goal should be to **minimize content "below the fold"**. Question if the content needs to be surfaced for the user. One example would be to test removing the

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“tags” section on the bottom of a series page and see if users miss it. Another would be to make the citation a button with modal popup, instead of two lines of content, since only a small percentage of users use a small percentage of the time, and those who do use it are incentivized to click. **Only display what users truly need** to explore content and learn.

Additionally, the UI review should include examining the website’s text, headings, and links for **web-readability**. Writing for the web is different from academic or print writing. Users generally skim web content to **text should be short and to the point**. Heading and titles need to describe quickly and accurately the content below. “Related Resources” and “Related Content” mean little to users; “Similar Series” and “Series News” give more valuable information.

Once the team has done a content and feature review, I suggest the team **hire a UX Designer to create wireframes and design prototypes** for the Homepage, Series, My Account/Saved Graphs/Dashboards, and Search Results pages. The designer can address the issue of a combination of too many links and a under-utilized real estate through **better content layout**.

Articles on best practices in user interface design can be found in Appendix D.

## Training Sessions

Trainers are well-versed in their materials and in teaching principles, but can benefit from a few tweaks to the training programs. First, I suggest **limiting the number of products introduced** in a one day training session. Second, training in use of web products can be unwieldy. A simple **presentation board** with bulleted steps, defined success points, and areas for further exploration can help users stay on topic, keeping quick learners from losing focus and providing slower learners a reference point if they fall behind. Lastly, since the training sessions consist largely of participants following steps, more **room for discussion** should be made to help participants grasp the theory and work behind the actions. Trainers have attempted to engage in this activity with simple questions to little result. Please read Stanford’s “Designing Effective Discussion Questions” in Appendix D for more details on how to increase discussion participation.

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## Product & Feature Integration

There are many ways that products and features can be integrated and promoted by the Research Division of the Federal Reserve Bank of St. Louis. Some of these suggestions require significant development, while others may just require advocating for more prominent placement on the Bank's website, or simple link redesign on the FRED website.

- **GeoFRED should be developed into FRED** rather than exist as a separate product. On series with mappable data, this could be a "switch to map view" or "compare on map with other series" feature, similar to how Yelp has a map toggle.
- **"EconLowDown" should be the subheader instead of "Online Course Login"** on <https://www.stlouisfed.org> under the Economic Education tab. This title and the links below do not make clear to users that this is EconLowdown. Additionally, it is confusing that the image EconLowDown in the right column does not go to <https://www.econlowdown.org> but to the same link as the "Economic Education Home". While the 8 links under "Economic Education Home" header are all present on the <https://www.stlouisfed.org/education>, the EconLowDown header on this page makes it seem like all content on the page is about EconLowDown. **Consider removing the header and making sidebar links "EconLowDown Teacher Login" and "EconLowDown Student Login"**. Further usability study work is needed to understand why these are not just links on <https://www.econlowdown.org>.
- Highlight the **Release Calendar** on the homepage by making it a calendar image, or, even better, a functional calendar that can be opened to see more.
- **Series news should show up as an RSS feed on the series page**, similar to how it does on the homepage. Though this data is currently (if inconsistently) pulled in under the Related Content section, the news articles are indistinguishable from other chunks of data placed here. Using the RSS feed symbol and article title link will make it more recognizable.

## Search

The search functionality of FRED is an ongoing, iterative development project. As the team grapples with an ever-increasing number of series, the greatest long term solution they have in their arsenal is a **new FRED-S metadata schema** created by the librarians of the



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Research Division, which will both increase usability of data in FRED and serve as a standard for the field overall. Because implementation will be time intensive, and maintenance costs will rise, I suggest the team **select 3-5 high value metadata fields** beyond the fields that map to their current metadata to **implement a pilot project**. This will complement the UI review and determination of what is the most important metadata to display on various interfaces.

Determination of metadata prominence can be enhanced by **public outreach to users through a survey** to rank all possible data points by importance.

An underlying issue that should be considered in any search-related development work is where the new feature or design change will **place the FRED product on the scale from flat access to data to strict hierarchical data presentation**. Users move from comfort with flat search to interest in hierarchical information access as they become more sophisticated in their knowledge base, and the FRED team must continue to seek out the “sweet spot” that invites new users but also encourages those gaining expertise to continue their interactions.

## Recommendations

While the previous sections describe solutions concrete issues and suggestions for enhancement areas, it is also useful for the FRED team to have distinct guiding principles in developing the FRED product. Historically, the team has tried to be all things to all users, a noble goal but difficult to implement. Here I list some **general recommendations that may help guide the next iteration of work**. Of course, such recommendations should be assessed regularly and re-aligned to new priorities as they arise.

### **Recommendation 1: Prioritize the *College Student* persona in development work.**

**Reasoning:** Development decisions can get stuck in questioning if privileging one type of user will upset or hurt another type. College students are tech savvy, adopt new technologies quickly, eager to learn, and have the potential to be lifelong users of FRED as they move forward in their careers. This aligns with the long term goals of the Research Division and can give more clear direction for development. Assessment should be done after a few iterations to see the impact on other personas. Additionally, since in-person

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marketing is mostly done through the *College Professor* persona who is proven to adapt technology slower, I suggest inviting professors to bring their top students to training.

**Recommendation 2: For the user interface, live by the mantra “simpler is better”.**

**Reasoning:** Users experience overwhelm when interacting with FRED on many levels. While all the information shared on the website is useful, none of it is useful when users stop reading. Determining the most important pieces of data and least important will help cut away chunks of text and make users feel that the product is more manageable. Some of this can be done through better UI design, but “less is more” mentality will help onboard new users and make all users feel the site is lightweight and easy to navigate.

**Recommendation 3: Invest in marketing and demos for features and datasets.**

**Reasoning:** The FRED team has made great efforts to create features for deep exploration and manipulation of data, but many features are somewhat hidden or unintuitive when users stumble across them. While creating videos demos has an upkeep cost as the website changes, demos highlighted on the homepage and in media channels will increase engagement with the website and highlight the value-added services FRED offers in comparison with its competitors. This can also include curation of dashboards to get users more comfortable with them.

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## Implementation & Assessment Plan

This usability enhancement project has resulted in three levels of work to be implemented: discrete **usability issue solutions**, broader **suggestions for increased usability**, and **recommendations for aligning work to achieve long term goals**.

The FRED product team has agreed to implement the **solutions to usability issues** by creating stories, assigning points, and **adding issues to their development tasks in scrum meetings**. Assessment of the impact to the user experience of the series page and search results will be done by **continuing observation of training sessions**. The training team should see a decrease in observed usability issues, and, if not, find alternate solutions to issues. The User Accounts team is already working on a **Version 2 of My Account**, and has agreed to integrate usability solutions from this report into that project. This team has had their development time focused on other projects for the last six months and has a less distinct timeline for addressing the usability issues, but similarly will be able to assess the results through continued observation at training sessions.

The **suggestions for enhancement areas** will be implemented on a longer timeline, involving **project management** to plan, gather development tasks under umbrella projects, and address staff concerns over increased workload. For the user interface update, product and feature integration, and search functionality enhancement, integrating **Google Analytics reporting** more programmatically into scrum meetings and decision making will help in assessing impact. Tagging and reporting should be done at task creation, then reviewed regularly throughout the life cycle of the implementation, and referenced repeatedly as part of ongoing assessment.

The **recommendations** in this report are meant to be implemented as **underlying directives** towards all work developing FRED over the next few years. The teams should ask themselves if new development tasks align with these recommendations, which will help ensure that the product is moving in the right direction. Recommendations should be updated every few years based on the Research Division's stated goals for FRED.

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## Appendices

Appendices hold all the data referenced in this report. Please review each carefully. Many hold extra data about bugs or issues with products that were not relevant to this report but may be of use to the FRED team.

### Appendix A: Observation Sessions Raw Notes

#### Santa Monica Community College Workshop

9/29/2017

20 attendees. 6 had never used FRED, 8 had used as examples in class lectures, 4 had used in assignments with students. *Teaching note:* These numbers are rough because Keith was talking through asking them and people didn't seem to know when to raise their hands. Needs to be organized better for real data.

Common belief and criticism of FRED is that you can only use it to teach macroeconomics, but the team is trying to show you can use it for micro as well.

About 4 people were so tech-averse they couldn't even figure out how to create accounts, or get through the image security prompt. Additionally, people had a hard time just staying on the pages they were asked to be on. Lots of clicking around, not paying full attention to the lecture, i think because they were waiting for their peers to catch up on login. *Teaching note:* Perhaps have everyone make an account before class.

#### FRED Search Results

Users are clicking checkboxes instead of title to get to series page. The checkboxes are confusing them. If purpose is to be able to add multiple graphs at once maybe ask that in title or have toggle to that option, as it is clearly not the majority of users that want that option first but majority of people are following that behavior pattern.

"Gasoline prices" smart enough search that it looks for tag "gas", and then shows that tag above search results. This tiny bit of data does give information, but should be hidden. Showing it as a tag and then having the sidebar tags as limiters that you can then remove/exclude makes this section confusing. Too many different actions happening here. Especially as search term does not change in actual search bar. Hide the blue "original" search term here and everything will be easier to understand

#### Series Page

On CPI series graph, the legend is in 5 year increments so ends at 2015. Someone asked why they can't see to the present even though the data is monthly. Does the legend need a "Now" point at the end for last? *Teaching note:* Keith should ask where people can read the

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frequency/adjustment on the graph rather than telling people.

Change is frequency-specific in “unit” section of edit panel for a graph. “From year ago” CPI percent change - is this normal terminology? “Modify frequency” to annual ends up changing to be the same as “from year ago”. There are 2 ways to do the same thing and that can be confusing and makes the page busier. Note that frequency on the top of the graph will still say monthly, because that is the frequency that the data comes out, even when the data now shows annually. Mixed messages when looking at the graph as its own image - technically incorrect metadata.

Format tab seems intuitive to everyone in the room with any tech skills.

For zooming date range on the graph some people are stuck in the side panel, not realizing they can touch the graph while the panel is open. I think this has to do with the old-school website understanding of side panels and the way it pops out almost “over” the graph. Maybe if it just slid differently users wouldn’t get stuck here.

Why can you only change the date range in the graph and not in the edit panel? There are so many other things in edit panel...why were some put there and some on graph?

1 yr/5yr/10yr clickable in the top of graph - many people aren’t finding it, confused by where it is and what it does. Maybe add the word “last” and move towards where the rest of the date range actions are [bottom of graph]

Account Tools button should not be a drop down, just have items broken out as their own buttons. Unneeded click.

Daily data will load the last 5 years in a graph as a standard, all other frequencies show the entire series dataset. You do see full timeline on bottom but maybe some other indicator of 5 year status is needed.

“Line 1, Line 2” how are students keeping track of which line is what while editing in the panel? Changing graph type in format tab is a popular action but the dropdown looks just like the rest of the menu options here. What about boxes with images of each type of graph? Or as Keith mentioned, using Font Awesome icons? (scatterplot issue). I can mock something up here that will make this option pop out more and make this panel less monotonous/overwhelming. *Teaching note:* for class, have list of actions to accomplish for those who want to go ahead. People get lost after getting distracted waiting for their peers to catch up.

Save graph popup does not show you the observation range option unless you happen to be looking at the latest data. A cool feature that is hidden and unknown by people playing around! Must surface this somehow.

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“Graph saved to dashboard” notification should have link for people who want to go straight to that dashboard! Easy enhancement

My Account - Saved Graphs - Search bar has no helper text to let people know it exists! No one could find it, easy fix.

### **Dashboards**

Terminology makes you think it would be the whole “my account” dashboard with saved graphs. No one seemed to understand that you could make posters/info guides. If they are meant to be the latter, need more functionality. “Edit” saved graph bring a pop up that seems to only allow you to edit the title, unnecessary new screen, have them be able to change title with pencil icon right on screen.

When in dashboard when you click on a graph is just zooms the image rather than bringing you to the graph (small link on right). Everyone messed this up, Keith included! Must change. Download options are currently only on series page, users want to be able to save formats from saved graphs/dashboard page. Again because dashboard is an awkward label.

Data lists allow teachers to pre-make series lost on a dashboard so students don't have to search 500k titles (often complex, and show up in autofill only when typed correctly). There are public dashboards but you need to have the link! FRED team needs to make a public list of great dashboards for teachers to work with. Will take curation effort.

Bug: my account/logout is not showing up on FRED homepage. Many computers.

### **FREDCast**

First, there's no way of finding FredCast from the homepage of STL Fed or FRED? You can be in many leagues and only forecast once, it goes across all leagues - how does one learn this information? Green “enter” button looks like an active tab indicator. Consider moving out of menu area. Then there are save/revise buttons but boxes look like they can always be edited? Need to gray out when saved. Mixed signals in UI. Download CSV only downloads one month's data, not say, over an entire semester. Potential for enhancement here for teachers.

### **EconLowDown**

Questions are in a bar on the bottom, makes it seem like the user cannot scroll down the page. Cannot redo previous steps. Confusion on purpose of pre-test and post-test. Pre-test handles both prior knowledge AND ability to find information on the page, post-test tests information literacy skills gained after being walked through content. Most users seemed to think they should do the pre-test without reading the content on the page.

Notes taken by George Fortrier

19 attendees - 11 knew about FRED before the workshop; 6 of these used FRED before the workshop; 4 of these used FRED in the classroom. At least 5 identified themselves as econ teachers, both micro and macro. Others taught finance (S.Trapani) and math (S.Yuan). One (H.Winestock) was from the non-academic social science realm. Eight were students, most if not all were FRED Challenge participants and/or students of S.Kone.

N.Papanikolaou indicated that he directed students to FRED for data downloads; he also compared the limitations of the FRED Excel Add-in with actual FRED. I wouldn't categorize him as a FRED expert, as he was challenged by some aspects of the site, specifically dashboards and saved graphs, but also some graph-building tasks.

T.Mutafoglu was a superuser. Although not immensely familiar with FRED, he was capable of negotiating the site completely independently. He finished the FRED interactive first. More importantly perhaps, he took copious notes on many aspects, with interest, including GeoFRED and FREDcast.

S.Kone felt very comfortable asking for assistance throughout the workshop, for directions on completing tasks and also for guidance on the sequence of tasks. He was conscientious. GeoFRED's zoom feature was a stumbling block. Relied on his partner at his table for assistance (S.Yuan).

S.Trapani was especially engaged/proficient, articulate, and enthusiastic about what was presented. Seems a potential FRED ambassador. After some prompting, he remarked that he'd tried to independently master FRED's more-complicated parts (months prior) but found it too challenging; he advised a follow-up to the workshop to reinforce what was learned.

Expert students: A.Carvajal, A.Aryal, M.Arbelaez, D.Jimenez, P.Labh, K.Shrestha  
Needing a little more guidance: Y.Meraz; relied on her partner at her table for assistance (A.Carvajal). Difficult to identify level of FRED engagement, but strong engagement with iPhone: H.Choudhury

### **Flow and process**

Workshop seemed to run well. Instructions seemed clearly understood vast majority of time. Attendees had less opportunity to make independent decisions on the site. If they followed instructions without getting side tracked, they most often took the right paths. The team directed attendees to ask for help from neighbors, and many did this. This cooperation allowed for a smooth workshop and required less individual attention most of the time. However, these factors encouraged attendees to ask for help immediately, rather than struggle through obstacles. Thus, it was possible to observe some points at which

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attendees slowed down, but it was not possible to observe how they might have tried to solve their problem independently. (That is, they turned to neighbors to ask for solutions. Some exceptions to this process are noted below.

Some vocal interaction among team members might be slightly distracting to attendees. For example, team members often requested the presenter take a certain action or offered additional input.

### **Usability issues**

RE: "Save Graph" and "Add to Dashboard" options under "Account Tools" menu. Some had confusion about the meaning / distinction between "dashboard" and "saved graphs." Two users raised questions re: the fact one of them gave the same name to a dashboard and a saved graph and what is the best sequence to use for naming. I didn't hear the directive (if there was one) about saving the graphs, but about 3/4 of attendees understood and did so independently. A few attendees (3 or 4) had trouble moving back and forth between the graph and the dashboard. A couple of users had trouble finding/using the "Add widget" option.

Of those with the most trouble keeping up: They seemed to often divert their attention to non-workshop tasks and got behind by one or two steps. For example, 4 or 5 at one time or another couldn't render the exact graph that was being shown on the screen in front of the classroom; usually they missed a change to the format because they were otherwise occupied. Of those with the least trouble keeping up (esp. the students): Even if they paused to, for example, check in with Instagram, they easily got back to the graph after I made my way over to look at their progress.

About 5 attendees had the same issue with an odd (unintended) display of a FRED stacked graph. FRED got a little buggy at this point for several users and even the team members. I noticed some attendees devoted their attention almost exclusively to completing the tasks of creating or modifying a graph and paid less attention to the discussion of economics. A few tried to do both and fell a bit behind. Most could handle the two-pronged discussion, and several seemed to particularly enjoy dissecting the economic content.

### **Econ issues**

Many had quizzical looks during the distinction between CPI as "percent change" vs. "percent change from year ago." Perhaps the question was why that was called for.

### **GeoFRED**

One attendee had trouble finding GeoFRED; a few needed some direction to build a new map. "Edit Legend" was a stopping point for many, at various times for various tasks. The point had to be made that a change to the fractiles doesn't require an "Apply" action for the change to take effect.



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## **Econlowdown**

Slight digressions on the part of team members seemed to derail a few attendees. For example, during the Econlowdown IMP segment, attendees were told to log-in as students. But then the instructor panel was displayed and described. Because attendees couldn't see that content in their student view, some were confused and half a dozen or so struggled to try to find that content. Might be better to show attendees the instructor panel first, and then have them log-in as students and complete the FRED Interactive.

More directives about "put down your pencils and look up here at the front of the class" might avoid similar lapses. To be clear: Most lapses seemed user-generated, but a few might have been minimized if attendees had direction on targets/what to focus on.

The attendees who were actual students eagerly worked through the FRED Interactive as Econlowdown students with great facility and no hesitation. Some of the attendees who were actual teachers were stymied by some parts of the process and/or what was being asked of them: eg, S. Kone, N.Papanikolaou, C.Elias spent time analyzing the screen in the FRED Interactive rather than focusing on the questions/tasks at hand.

## **FREDcast**

A few attendees had trouble finding FREDcast when it was called for. Simply how to proceed from creating a user name (including how to "enact" that name) was a stopping point for at least 4 attendees. I also find this step less illuminated than it might be. Users had confusion about how to enter and potentially revise forecasts and how the completed forecast session would be revealed. Once the team gave instructions on forecasting all 4 variables, that confusion dissipated.

The FREDcast segment of the workshop included movement back and forth between FREDcast and FRED graphs, which of course makes sense. This segment could first offer prep work on the FRED graphs of the 4 variables to forecast. Then attendees could be directed to move to the "click and do" set of actions in FREDcast. The walk-through of FREDcast could include reference to the points already made about the variables/graphs in FRED (to minimize the back and forth between FREDcast and FRED graphs).

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## **Lorain County Community College Workshop**

**Nov 10, 2017**

22 participants. *Teaching note:* start the classes by explaining the overarching "what are we doing" before just starting to navigate to GDP. No one in the room understood why they were doing the steps until the very end and therefore were just following instructions rather than thinking critically.

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**Bug:** (kind of) user had their adblock on, so the “share links” button nor the social share options showed up for him.

3 users clicked “download” instead of “edit graph”. No one in the room can find the search bar on the saved graphs page. Clicking on graph as just zoom confuses most people in the room.

**Bug:** Class went to create dashboard, but then from “save graph” there is no list popping up from “add to dashboard”

**Bug:** powerpoint plugin - notes do not show up when you put the dashboard into powerpoint.

From dashboard in graph “save data” button just does excel. This function is available in other places but with slightly different action - user dissonance. Make it only in one place or make it the same everywhere.

**Edit graph** - changing unit, when annual data is in the graph, selecting “from year ago” ends up being the same. Two ways to do the same thing is annoying.

Source does not come up in the search results so ADP’s Total NonFarm PayRoll Employment looks the same as the BEA’s “All Employees: total Nonfarm Payroll” and series code doesn’t show on graph line key.

Diego prompted class to click checkbox and then add to graph so I was not able to see if the users would have figured that out or if they would click on title and add second or click into the checkbox title.

In general, there was a lot of “teaching to the issue” or leading by the trainers so that i could not observe issues that were found in earlier sessions.

A few users when told to start doing a search in FRED start at the Research page instead and then are confused when they don’t get the results they want.

### **GeoFRED**

Strict search is problematic - “housing prices” doesn’t come up because the series is called “house prices” - need softer search

From GeoFRED have to click “customize” on the data popup to go back to FRED graph. No one in the room know this because you want to go back to FRED without customizing. Again, ideal solution would be to just be able to click on the graph.

### **EconLowdown**

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Product needs to be its own link under the STL Fed's "Economic Education" section. It doesn't even come up in the site search!

## Illinois Wesleyan University Student Observation

12/4/2017

13 students

### Search Results

"Add to Graph" button hard to find. Some are clicking on the title of one. "I don't know how to add a second". Some having trouble even finding the series. URI search in google does not show the series directly.

8 students are rushing through the exercises. They are understanding directions quicking, able to find what they are looking for after going through the awkward first step of opening the series into a graph from search results.

### Edit Graph

No problem with clicking over into the edit graph and understanding that they can still move around in the graph itself. Tech savviness much higher here.

All students are able to follow the directions Diego gives, but do not seem to understand the process, said they would not be able to do the exercise from start to finish without each step being prompted.

1 student had the incorrect series to begin with so his transformations were not looking the same. In general everyone was looking at each other's screens to make sure they were doing the right thing, or at least achieving the same end result.

Class exercise was only to do economic transformations, so FRED only. They did not access the dashboard or my account area at all, but said they would since they will probably use FRED again to do assignments in other Econ courses.

## Appendix B: Observation Sessions Coded Data

Issue Description	Santa Monica	New York	Cleveland	AVG	Score	Normal
search results page: users clicking on checkboxes instead of titles when trying to get to series page	some	none	some	6/4	1.5	some
search results: users not finding desired series	a few	preempted	some	4/3	1.3	a few
Search results: can't find related data	A few	preempted	some	3/2	1.5	

series page: graph does not show "now" point, users think data ends before it does in views like 5 year	a few	preempted	preempted	1/1	1	preempted
Series page - edit panel: "Modify frequency" to annual same as "from year ago". 2 ways to do the same thing, confusing, makes page busier.	some	none	some	4/3	1.3	
Series page: Frequency on top of the graph will say monthly, because that is the frequency that the data comes out, even when the data shows annually.	some	preempted	a few	3/2	1.5	
Series page: For zooming date range on graph some people are stuck in the side panel, not realizing they can touch the graph while the panel is open.	some	a few	a few	4/4	1	none
Series page: 1 yr/5yr/10yr clickable in the top of graph - not finding it, confused by it, do not realize it means past X years from current date.	some	preempted	a few	3/2	1.5	
Series page: Save graph does not show observation range option unless you happen to be looking at the latest data, users confused by different views	many	none	preempted		1.5	
Saved graphs: can't find search bar	many	some	many	8/3	2.6	
dashboard: users don't know what this means, assume its where saved graphs and other features will be.	many	many	many	9/3	3	
dashboard: users trying to edit graphs like in "saved graphs" section	many	some	some	7/3	2.3	
dashboard/saved graphs: clicking on graph opens image view, users expect to get to graph. instead have to click small corner link, which is not obvious	many	some	many	8/3	2.6	
dashboard: users expect to be able to download from here	some	none	some	4/3	1.3	
users clicked download instead of edit graph	a few	none	a few	2/3	0.6	
users started from Research page instead of FRED	a few	none	a few	2/3	0.6	A few

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## Appendix C: Qualitative Sessions Raw Notes

FRED Focus Group at Professor's Conference, St. Louis

11/2/2017

6 participants

### 1. How do you use FRED?

David - doesn't teach a lot but sometimes uses it in graduate courses for homework exercises in international economics. Assignment is 6 problem sets using FRED for data analysis. Students never download data correctly so he gives them the dataset and then they use it in Excel. \*problem\* what is being downloaded? When manipulating the chart, does it change the data?

Gayle - macro principles/elementary applied statistics courses. To make graphics, do simple statistics, use GeoFRED for stats, percentiles, messaging. She makes them do the manipulations in the classroom.

Michelle - workshop for high school teachers infusing economics principles into biology, english history, spanish, and civics classes. Unemployment data and business cycles, GeoFRED for county information. Shows lesson ideas for teachers to bring to their classes, such as building up the components of GDP

Hossein - monetary policy/financial markets college courses. Looks a lot at daily data. Charting in graph recessions, efficacy of monetary policy. Inflation. Class uses FRED as a tool that they end up using for final projects.

Heather - in principles of macroeconomics course, she uses it during lecture and creates dashboards herself as lecture aids that the class then accesses.

Felix - macro principles class - charts GDP, unemployment, and inflation as performance measures of the economy. Looks at velocity measure, showing them in class and then have them do it as homework. He does not make students create an account or save the graphs.

### 2. What series do you look at? How do you navigate to them?

David - looks at exchange rate data, LIBOR, "US - Euro Exchange Rate". Goes from the At A Glance section and then adds in "US-Pound Exchange Rate" on graph. Heavy graph user, does this weekly.

Gayle - Using At A Glance and search bar, but very careful with long list, have to write down FREDs name for it and hand feed to the class. Always very mindful of complex titles.

Michelle - Unemployment, likes that it's broken down by location and that you can save a graph and have it auto update.

Hossein - looks at tons of different series all the time.

Heather - GDP, Inflation, Unemployment - starts at google and searches with "FRED"

Felix - GDP and its components, goes from At A Glance.

### 3. What frustrates you the most about using FRED/What features are you looking for?

That if you don't know the exact words it can be really hard to find a series. Keith shows the "textbooks" versus educational books example. Finds recreational, then goes to the release

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schedule. All 6 participants agree they would never think to find the release schedule where it was, or look for items near the selected item to find what they want.

#### **4. What do you do with data when you go straight to download? In what situation do you download instead of using in FRED?**

Mostly to make sure students are using the correct data, some students always end up downloading the wrong thing if they aren't given the data. The assignments require them to use excel to learn the functions.

**Bug (?):** From dashboard in graph "save data" button just does excel. This function is available in other places but with slightly different action - user dissonance or bug? Make it only in one place or make it the same everywhere.

#### **Notes from conversations with staff**

Chris says the tags are not always used well, for example "GDP" tag is overused. Chris and Yvetta say the largest issue they hear from users is the search functionality - that users do not understand filters and tags. They use about 6,000 tags, most of which are geographic. These two believe maintaining the new metadata schema would be too much work, even if they hired someone to implement it.

Issue: Keith says the ability to re-index two series to the same base is the \*most important feature\* but no one in the focus group knew about it!

Issue: "CPI Less Food and Energy" will automatically show when you search for food, even though it's the opposite. When you exclude food from search, this series disappears.

Issue: Series pages don't obviously or uniformly show the series announcements from the blog. May be important to user, like if the series has been discontinued.

Yvetta wants to be able to mass delete graphs, everyone on the FRED team has tons of them in their accounts.

Enhancement: be able to use data list as list of series that you can then checkbox click to make a comparative graph, rather than having to go to one and then find the other in the "edit graph" section. Right now this only works in search results if both graphs you want are on the same page of search results!

Issue: Edit graph search box is not flexible like the main search bar.

\*Products to compare: Bloomberg Terminal, Haver Analytics. Ask to use these at Jan 15 meeting.\*

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## Appendix D: Market Research Literature

Employees associated with the FRED product are experienced practitioners deeply versed in the best practices of the field, but reviewing relevant literature regularly helps to keep concepts fresh in mind. Based on the results of this usability enhancement project, I suggest reading (or re-reading) the following:

### For Trainers

[Designing Effective Discussion Questions](#), Stanford University's Teaching Commons

[Getting Users to a Specific Feature in a Usability Test](#), Jakob Nielsen

### For Developers & Content Creators

[Minimize Cognitive Load to Maximize Usability](#), Katherine Whitenton

Book: Usability of complex information systems : evaluation of user interaction / editors, Michael J. Albers, Brian Still.

[Writing for the Web](#), Usability.gov

[How to Handle Changes in Your UI Without Causing User Backlash](#), everyinteraction.com

# Appendix E: UI Enhancement Screenshots

The screenshot shows the FRED Economic Data website interface. At the top, there is a navigation bar with the FRED logo, 'ECONOMIC RESEARCH' text, and a search bar. Below the navigation bar, a main heading states 'Download, graph, and track 507,000 US and international time series from 87 sources.' A search input field is present with the placeholder text 'Search FRED data e.g., gdp, inflation, unemployment'. Below the search bar, a link 'Browse data by Tag, Category, Release, Source, Release Calendar or Get Help' is circled in red. The main content area is divided into several sections: 'FRED News', 'FRED Blog', and 'Research News'. A large red circle highlights a blank space in the 'FRED News' section. To the right, there is a 'FRASER' section with the text 'Explore a digital archive of the nation's economic history.' Below this, a navigation menu is circled in red, containing 'AT A GLANCE', 'POPULAR SERIES', 'LATEST RELEASES', 'TOOLS', and 'NEED HELP?'. The 'AT A GLANCE' section displays several economic indicators with their latest values and change percentages, each accompanied by a small line graph icon. A large red circle highlights the 'TOOLS' and 'NEED HELP?' menu items, with red lines pointing to the 'SERVICES' and 'RESEARCH' sections in the footer. The footer contains five columns of links: 'SERVICES', 'RESEARCH', 'TOOLS', 'ABOUT', and 'OUR SITES'. At the bottom, there is a 'NEED HELP?' section with a 'FRED Help' link, a 'SUBSCRIBE TO THE FRED NEWSLETTER' section with an email input field and a 'Subscribe' button, and a 'FOLLOW US' section with social media icons for Twitter, Google+, Facebook, YouTube, and LinkedIn. The footer text at the very bottom reads 'Federal Reserve Bank of St. Louis, One Federal Reserve Bank Plaza, St. Louis, MO 63102'.



Categories > National Accounts > National Income & Product Accounts > GDP/GNP

### ★ Gross Domestic Product (GDP)

DOWNLOAD

Observation: Q4 2017: **19,738.887** (+ more)  
Updated: Jan 26, 2018

Units: Billions of Dollars, Seasonally Adjusted Annual Rate

Frequency: Quarterly

1Y | 5Y | 10Y | Max

1947-01-01 to 2017-10-01

EDIT GRAPH

#### FRED Gross Domestic Product



Shaded areas indicate U.S. recessions

Source: U.S. Bureau of Economic Analysis

fred.stlouisfed.org

Share Links Account Tools



- Page short URL
- Embed in website
- Image short URL

Release: Gross Domestic Product

Units: Billions of Dollars, Seasonally Adjusted Annual Rate

Frequency: Quarterly

BEA Account Code: A191RC

Gross domestic product (GDP), the featured measure of U.S. output, is the market value

of the goods and services produced by labor and property located in the United States. For more information, see the Guide to the National Income and Product Accounts of the United States (NIPA) - (<http://www.bea.gov/national/pdf/nipaguid.pdf>)

#### Suggested Citation:

U.S. Bureau of Economic Analysis, Gross Domestic Product [GDP], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/GDP>, February 1, 2018.

#### RELATED CONTENT

##### Related Resources



Education Resource  
**FRED in the Classroom:  
Debt and Deficit**



FRASER Historical Document  
**The National Income and  
Product Account**



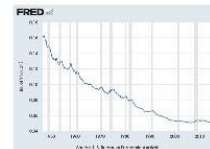
Article  
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trade deficit

new houses?

food for thought



ALFRED Vintage Series  
Gross Domestic Product

**Other Formats**

Annual, Not Seasonally Adjusted   Annual, Not Seasonally Adjusted   Percent Change from Preceding Period, Annual, Not Seasonally Adjusted

Percent Change from Preceding Period, Quarterly, Seasonally Adjusted Annual Rate

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RELEASE TABLES

**Gross Domestic Product**

- ▣ Table 1.1.5. Gross Domestic Product: Quarterly
- ▣ Table 1.2.5. Gross Domestic Product by Major Type of Product: Quarterly
- ▣ Table 1.3.5. Gross Value Added by Sector: Quarterly
- ▣ Table 1.4.5. Relation of Gross Domestic Product, Gross Domestic Purchases, and Final Sales to Domestic Purchasers: Quarterly
- ▣ Table 1.5.5. Gross Domestic Product, Expanded Detail: Quarterly
- ▣ Table 1.7.5. Relation of Gross Domestic Product, Gross National Product, Net National Product, National Income, and Personal Income: Quarterly
- ▣ Table 1.17.5. Gross Domestic Product, Gross Domestic Income, and Other Major NIPA Aggregates: Quarterly

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