

---

# **The Implications of Slow Growth for Monetary Policy**

---

**Charles L. Evans**  
**President and Chief Executive Officer**  
**Federal Reserve Bank of Chicago**

Credit Suisse Asian Investment Conference  
Hong Kong  
April 5, 2016

---

FEDERAL RESERVE BANK OF CHICAGO

The views expressed today are my own and not necessarily  
Those of the Federal Reserve System or the FOMC.

# The Implications of Slow Growth for Monetary Policy

Charles L. Evans  
President and Chief Executive Officer  
Federal Reserve Bank of Chicago

## Introduction

Good afternoon and thank you. It is a pleasure to be here.

Today, I would like to briefly give you my outlook for the U.S. economy before discussing some long-term economic trends and my views of appropriate monetary policy. Let me note that my comments will reflect my own views and do not necessarily represent those of my colleagues on the Federal Open Market Committee (FOMC) or within the Federal Reserve System.

I will start my remarks this afternoon with a forecast for the U.S. economy. My baseline outlook has real gross domestic product (GDP) growing at a moderate 2 to 2-1/2 percent annual rate in 2016 and inflation gradually approaching 2 percent over the next three years. But given the current economic landscape in the U.S. and internationally, I see the risks to both of these projections as weighted to the downside.

I will next discuss some underlying structural trends that are likely to have important effects on long-term growth prospects and interest rates in the U.S. and around much of the world. By most estimates, growth and real interest rates will be lower in the long run than we thought they would be just a couple of years ago. Monetary policy cannot alter these structural trends. However, they do factor into benchmarking policy neutrality and, hence, have direct implications for monetary policy.

I'll finish with my views of appropriate monetary policy in the U.S. You will see how these views are shaped by the structural trend benchmarks, the nearer-term economic outlook and, importantly, risk-management considerations. Currently, I believe it will be appropriate to make two more rate hikes this year and then follow a very gradual path of rate increases thereafter. This is the policy path underlying my economic forecast.

Of course, whether or not this path will, in fact, be appropriate depends on how the incoming data influence the FOMC's outlooks for growth and inflation as well as its assessments of the risks to those forecasts. So you'll have to stay tuned to see how policy actually turns out.

Let me now turn to my outlook for the U.S. economy.

## **U.S. Economic Outlook**

I anticipate U.S. GDP will grow in the range of 2 to 2-1/2 percent in 2016. So, close to or a bit better than last year's 2 percent rate. The U.S. consumer is the linchpin behind this outlook. I think this winter's somewhat softer readings on consumption will prove to be transitory. This is because the most important fundamental factor supporting household spending is the substantially improved labor market in the U.S. Over the past two years, the unemployment rate has fallen to 5 percent, half its 2009 peak, and job growth has averaged well over 200,000 per month. These gains have raised incomes and buoyed confidence over future job prospects. Lower energy prices and accommodative monetary policy have provided additional support to the spending wherewithal of households. All of these factors should continue to generate fairly solid increases in consumer spending — particularly given my assumption that interest rates will stay quite low for some time.

However, juxtaposed against the relatively solid prospects for household spending, there are several factors weighing on economic activity in the U.S. The slowdown in global economic growth — notably in emerging market economies — and uncertainty about international prospects have contributed to a rising dollar and declining commodity prices since mid-2014. The trade-weighted dollar has appreciated almost 20 percent since June 2014, while oil prices are down around 65 percent over the same period. U.S. firms that sell their products in global markets and those exposed to commodity markets have felt the brunt of these relative price movements. All told, net exports have made noticeable negative contributions to U.S. growth in the past two years.

As the uncertainties over foreign growth prospects resolve — hopefully, for the better — the upward pressure on the dollar should diminish and the international headwinds on domestic growth should dissipate. Still, I do not expect the international sector to be an engine for U.S. growth for some time. This view of moderate global growth is fairly mainstream. For example, in its latest projections, the International Monetary Fund (IMF) expected world output to increase around 3.5 percent per year over the next couple of years. This is considerably slower than the 5 percent pace in the pre-crisis period.<sup>1</sup>

In part reflecting these global issues, financial conditions in the U.S. have tightened noticeably since the middle of last year, likely dampening the spending of both households and businesses. Indeed, business capital expenditures have been lackluster since late 2014, and the most recent indicators suggest that a rebound is unlikely in the near future. In a partial reversal, we have seen some improvement in credit conditions over the past several weeks; hopefully, these will be sustained and contribute to firmer business-sector spending not too far down the road.

All told, I see real GDP increasing in the range of 2 to 2-1/2 percent over the next couple of years. This pace is somewhat stronger than where I think the underlying trend for growth is right now, but not by a great deal.

---

<sup>1</sup> International Monetary Fund (2016).

As you know, the U.S. Congress has mandated that the Federal Reserve foster economic conditions with the aim of promoting two economic goals — maximum employment and price stability. How are we doing in achieving these goals?

Along with most of my colleagues on the Federal Open Market Committee, I judge that an unemployment rate that averages somewhat under 5 percent over the longer run is consistent with the Federal Reserve's maximum employment mandate. The current unemployment rate is 5 percent. However, a broader array of measures — subdued wage growth being a particularly important one — suggests that today there remains some additional resource slack in labor markets. Let me be clear: We have made tremendous progress. But I'm not completely confident that we have met our employment objective just yet, and probably won't be until the unemployment rate is modestly below its long-run normal level. Now, given my outlook for growth, I expect the unemployment rate will edge down to between 4-1/2 and 4-3/4 percent by the end of next year. So, I do think the FOMC's employment objective is within sight.

How about the inflation objective? Well, the performance on this leg of the dual mandate has not been as good. In January 2012 the FOMC set 2 percent inflation — measured by the annual change in the Price Index for Personal Consumption Expenditures (PCE) — as the explicit inflation target consistent with our price stability mandate.<sup>2</sup> However, over the past eight years, PCE inflation has averaged only 1.5 percent. To get a sense of where total inflation is likely to be headed over the next year or so, I prefer to strip out the volatile and transitory food and energy components and look at so-called core inflation. Core PCE inflation also has run well below 2 percent for quite a long time. Over the past couple of months, however, core inflation moved up to 1.7 percent on a year-over-year basis. I am encouraged by this development, and have raised my forecast for core inflation in 2016 to 1.6 percent. Looking further ahead, I see both core and total inflation moving up gradually to approach our 2 percent inflation target within the next three years. This path reflects the dissipating effects on consumer prices of earlier declines in energy prices and the appreciation in the dollar, as well as the influence of further improvements in labor markets and growth in economic activity.

However, I am a bit uneasy about this forecast. It is too early to tell whether the recent firmer readings in the inflation data will last or prove to be temporary volatility and reverse in coming months. We saw this happen in 2012. And there are some other downside risks to consider. International developments may result in further declines in energy prices or greater appreciation of the dollar. Most worrisome to me is the risk that inflation expectations might drift lower. Here, I find it troubling that the compensation for prospective inflation built into a number of financial market asset prices has fallen considerably over the past two years. More recently, some survey-based measures of inflation expectations, which had previously seemed unmovable, edged down to historically low levels. True, financial market inflation compensation and some survey measures of inflation expectations have risen a bit of late, but they still remain quite low.

---

<sup>2</sup> This was first acknowledged in Federal Open Market Committee (2012a); for the most recent statement of our longer-run goals see Federal Open Market Committee (2016b).

To recap, I expect the U.S. economy to grow at a moderate pace over the next few years. This growth will be primarily driven by further increases in household spending. I also expect to make additional progress toward our 2 percent inflation target. While I see this path for the U.S. economy as the most likely outcome, there are a number of downside risks to my outlook for both growth and inflation. Before discussing the implications of this forecast for my views on appropriate monetary policy, let me put my growth outlook in a longer-run context.

### **My Growth Forecast in Longer-Run Context**

By historical standards, my forecast of real GDP growth in the range of 2 to 2-1/2 percent doesn't seem particularly optimistic. It's in line with the average pace of growth since 2009, which is about 2-1/4 percent. By comparison, over the previous three expansions real GDP growth averaged closer to an annual rate of 3-1/2 percent. The decline from 3-1/2 percent growth to 2-1/4 percent makes one sit back and take notice. What's going on? Why has growth in real activity been so subdued in the current expansion?

For one thing, the financial crisis and the ensuing Great Recession had far-reaching negative effects. You are all too well aware of these scars. With the support of accommodative monetary policy, these impediments to growth have been slowly dissipating. Nonetheless, I think these and other headwinds will take some more time to completely fade away.

In addition, as I survey the economic landscape, I see other factors that could hold growth back even after these impediments recede. Broadly speaking, an economy's long-run growth potential depends upon increases in its productive resources and the technological improvements that enable those resources to produce more. And these trends don't look favorable.

One important productive resource is labor. Here, demographics are working against us. The U.S. Census Bureau projects that the population aged 16 and over will grow a little less than 1 percent per year over the next ten years; by comparison, between 1990 and 2010 the average annual growth of the adult population was 1.2 percent. Moreover, our population is graying, and consequently, fewer of us will be working. Over the next ten years, the share of the population that is 65 or older is expected to increase about 4 percentage points from 15 to 19 percent. Since about 2000, this aging of the population and other long-running trends have been bringing down the fraction of the population participating in the labor force. My staff's estimates suggest that these structural factors will reduce the growth of available workers by about a quarter of a percentage point per year over the next ten years or so. Slower growth in available workers translates into less potential output growth.

My staff also estimates that between 1980 and 2000, higher educational attainment and increases in workforce experience added more than half a percentage point a year to labor quality — that is to say, the effective labor input into the aggregate production function for the U.S. grew a half a percentage point a year faster than the increase in

total number of hours worked.<sup>3</sup> However, further progress seems to have stalled as new entrants to the labor force have roughly similar educational attainment as retiring baby boomers, but less work experience. This is another possible reason for slower potential economic growth.<sup>4</sup>

Economic growth over the longer run also depends upon technological progress. By one carefully estimated measure — made by John Fernald at the San Francisco Fed and his co-authors — the underlying trend in total factor productivity (TFP) growth has declined from 1.8 percent during the productivity boom of the mid-1990s to the mid-2000s to a mere half a percent today.<sup>5</sup> That is in line with the period of low productivity growth from the 1970s to the mid-1990s. Some economists, such as Robert Gordon (2012) at Northwestern, think that the slowdown in trend productivity growth possibly is here to stay. Gordon argues that the search for transformative technologies that spurred productivity and economic growth in the past has become increasingly costly and more difficult to harvest: We have already picked the low-hanging fruit. The gloomy conclusion of his line of reasoning is that slow productivity growth will hold back potential economic growth for the foreseeable future.

Not everyone subscribes to the view that TFP growth will inevitably slow because of the dearth of new inventions. Rapid advances in the field of medicine and in energy production are two examples of where we have seen huge productivity improvements. Furthermore, it takes time for innovations to work their way into productive technologies. It may be that transformative innovations are being created today, but have yet to make their way through the pipeline to show up as measurable increases in factor productivity.

It remains to be seen if the current slowdown in productivity growth is temporary or more long lasting. That said, the notion that longer-run potential growth is slowing is a view that has been gaining traction lately. This assessment is reflected to some degree in the economic projections of FOMC participants. As recently as January 2012, FOMC participants assessed the long-run potential growth rate of the economy to be around 2-1/2 percent.<sup>6</sup> Today, the median FOMC participant believes that longer-run real GDP growth is only 2 percent. Even the most optimistic of my colleagues places this number at around 2.4 percent.<sup>7</sup>

When measured against these benchmarks, my forecast of real GDP growth in the range of 2 to 2-1/2 percent in 2016 is simply saying that the economy will expand a bit faster than its longer-run productive capabilities. This number may be disappointing — we would certainly like stronger sustainable growth — but there is nothing much that

---

<sup>3</sup> Aaronson and Sullivan (2002).

<sup>4</sup> Indeed, Fernald (2014) estimates that contributions to labor productivity from increasing labor quality declined noticeably in the 2003–07 period and, on average, he does not expect any boost to productivity growth from increases in labor quality going forward.

<sup>5</sup> Byrne, Fernald and Reinsdorf (2016). Total factor productivity captures the residual growth in total output of the national economy that cannot be explained by the accumulation of measured inputs, such as labor and capital.

<sup>6</sup> See Federal Open Market Committee (2012b). The full range of the longer-run estimates was 2.2 percent to 3 percent, and the central tendency was in the 2.3 percent to 2.6 percent range.

<sup>7</sup> Federal Open Market Committee (2016a).

monetary policy can do about labor force trends or technical progress. Still, these are structural conditions the FOMC must recognize when setting monetary policy.

### **Lower Potential Growth, Lower Equilibrium Interest Rates**

Importantly, lower potential output growth implies lower returns to investment. As a result, all else equal, equilibrium real interest rates, which are the rates consistent with fully employed resources, are lower in an economy with lower potential output growth. And, of course, lower real rates imply lower nominal rates, even when inflation is at its target. So, the equilibrium federal funds rate — which is the funds rate associated with a neutral monetary policy (policy that is neither expansionary nor contractionary) — is lower in an economy with a lower potential output growth. Therefore, the FOMC must take estimates of potential output growth into account when calibrating the stance of monetary policy.

Of course, there are other reasons why equilibrium interest rates are likely lower than they were in the past. For example, former Fed Chair Ben Bernanke has frequently discussed the global savings glut. As the world population has aged and as residents of fast-growing emerging economies have grown wealthier, the saving rate in most countries has increased. This has resulted in a larger pool of funds seeking safe, profitable opportunities for investment. However, domestic investment opportunities in most of these countries often have not kept pace with the increased saving rates. This higher supply of investable funds relative to domestic demand has driven down interest rates across the globe. In addition, former Treasury Secretary Lawrence Summers has expanded on these influences, speculating that soft aggregate demand worldwide has discouraged structural investment and capital stock growth (his view of the “secular stagnation” hypothesis). These two ideas are closely related.

All of these factors imply that the federal funds rate consistent with a neutral stance for monetary policy may be lower than we used to think. How big might these changes be? Well, in March, FOMC participants’ projections for the longer-run nominal federal funds rate were in the range of 3 to 4 percent, with the median projection at 3-1/4 percent.<sup>8</sup> Four years ago, when forecasts of potential growth were higher, the Committee was projecting the long-run funds rate would be in the range of 3-1/4 to 4-1/2 percent — about 50 basis points higher than today’s estimates.<sup>9</sup>

### **Global — Not Just U.S. — Trends**

Aging populations, lower productivity, greater propensities to save, increased demand for relatively safe assets and declining real equilibrium interest rates are worldwide phenomena. Two recent studies — one by the IMF, another by the staff at the Bank of England — document how common these developments are in both advanced and developing economies.<sup>10</sup> The studies also argue that these trends are likely to persist into the future, leading to lower potential growth for the overall world economy and lower real interest rates at both the short and long ends of the yield curve. So, unless there is a significant increase in trend inflation rates, nominal interest rates would be low as well.

---

<sup>8</sup> Federal Open Market Committee (2016a).

<sup>9</sup> Federal Open Market Committee (2012b).

<sup>10</sup> International Monetary Fund (2015) and Rachel and Smith (2015).

To be sure, this all isn't exactly new news; in advanced countries real and nominal yields on long-term bonds have been declining since the mid-1990s.

### What Is Next for Monetary Policy?

Lower long-run structural trends mean that, even after policy has normalized, the federal funds rate will likely end up at a lower level than in the past. I'd now like to talk about what the transition path to that new level might look like.

Again, I will refer to the Summary of Economic Projections. Here is the well-known and extremely valuable "dot plot." The chart shows each FOMC participants' views of the appropriate target federal funds rate at the end of each of the next three years and in the longer run. These views are conditional on the data and outlook as of our March FOMC meeting.

## Appropriate Pace of Policy Firming

Federal Funds Rate at Year-End  
(percent)



Source: Interest rate projections are from the March 16, 2016 FOMC Summary of Economic Projections. Market expectations are from OIS futures as of March 28, 2016.

Focus for a moment on the median of the policy projections, indicated by the red dots. The median participant expects only two more rate hikes over the remainder of this year and then an additional 100 basis points or so of tightening in each of 2017 and 2018. By historical standards, this certainly is a gradual path. It is even slower than the so-called measured pace of increases over the 2004–06 tightening cycle — that was 25 basis points per meeting, or 200 basis points a year.

At the same time, the median FOMC projection for the next three years envisions growth averaging slightly better than its long-run potential, the unemployment rate falling below its long-run natural rate<sup>11</sup> and inflation gradually reaching our target. Given such relatively good projections for the economy's performance, why is the median expected policy path so low?

Naturally, I cannot speak for my colleagues on the FOMC. However, there are several reasons why I think a very shallow funds rate path, such as the one envisioned by the median FOMC participant, is appropriate.

First, my forecasts for above-potential growth and lower unemployment depend critically on the accommodative boost from a gradual path for policy rates. Given my interpretation of conditions today, a faster pace of tightening than the one I envision would lead me to a less optimistic economic forecast.

Second, as I noted earlier, the FOMC needs to be concerned about inflation expectations slipping below its inflation target. If the public doesn't believe policymakers are trying to hit a symmetric 2 percent inflation target, it will be all that much harder for us to reach that policy goal. To convince them of this, appropriate policy should provide enough accommodation to generate a reasonable likelihood that inflation in the future could moderately exceed 2 percent.<sup>12</sup>

Third, the very shallow path also reflects my view that the neutral level of the federal funds rate today is lower than its eventual long-run level. By some estimates, the equilibrium inflation-adjusted rate is currently near zero. The degree of accommodation in actual policy needs to be judged against this benchmark. So the 75 to 100 basis point range for the nominal fed funds rate at the end of 2016 in the median SEP forecast is not terribly far below neutral.<sup>13</sup> The equilibrium real rate should rise gradually as headwinds fade over time. And as it does, the benchmark to judge policy accommodation will also rise. But this is likely to be a slow adjustment.

And finally, my view of optimal policy also provides for risk management. Here is what I mean.

Although I foresee moderate growth, that forecast faces a number of risks. On the upside, the solid labor market and continued low energy prices could lead to stronger household spending than expected — with attendant spillovers to other components of domestic demand. On the downside, the international situation could deteriorate — with related movements in the dollar and financial conditions weighing more heavily on

---

<sup>11</sup> The natural (or trend) rate of unemployment is the unemployment rate that would prevail in an economy making full use of its productive resources.

<sup>12</sup> This is not as heretical as it might first appear. After all, it is a simple consequence of having a symmetric inflation target: It is difficult to average 2 percent inflation over the medium term if there is little chance of inflation ever running above 2 percent. If policy preempts this possibility, the public could begin to mistakenly believe that 2 percent inflation is a ceiling — and not a symmetric target. As a result, expectations for average inflation could fall, lessening the upward pull on actual inflation and making it even more difficult for us to achieve our 2 percent target.

<sup>13</sup> Federal Open Market Committee (2016a).

domestic spending than assumed. Similarly, my inflation forecast faces two-sided risks. On the upside, the recent higher readings on core prices could prove to be more persistent than I have assumed. On the downside, the recent improvements could prove to be ephemeral, or there could be further declines in energy prices, appreciation of the dollar, or slippage in inflation expectations.

Faced with such uncertainty, policymakers could make two potential policy mistakes. The first mistake is that the FOMC could raise rates too quickly, only to be hit by one or more of the downside surprises. In order to put the economy back on track, we would have to cut interest rates back to zero and possibly even resort to unconventional policy tools, such as more quantitative easing.<sup>14</sup> I think unconventional policy tools have been effective, but they clearly are second-best alternatives to traditional policy and something we would all like to avoid. I should note, too, that with the economy facing a potentially lower growth rate and lower equilibrium interest rates, the likelihood of some shock forcing us back to the effective lower bound may be uncomfortably high. The difficulties experienced in Japan and Europe come to mind.

The second (alternative) potential policy mistake the Committee could make is that sometime during the gradual normalization process the U.S. economy experiences upside surprises in growth and inflation. Well, policymakers have the experience and the appropriate tools to deal with such an outcome; we probably could keep inflation in check with only moderate increases in interest rates relative to current forecasts. Given how gradual the rate increases are in the baseline SEP, policy could be made a good deal more restrictive, for example, by simply increasing rates 25 basis points at every meeting — just as we did during the measured pace adjustments of 2004–06. A question for the audience: Who thinks those were fast? So, to me, concerns about the risks of rapid increases in rates in this scenario seem overblown.

To recap, policymakers would have to resort to second-best policy tools to deal with unexpected weakness in activity or inflation, but we can use our old tried-and-true instruments for addressing stronger-than-expected outcomes. Even if the odds of upside and downside shocks are the same, the costs are not. How should the FOMC address these asymmetric risks? Well, we should buy some insurance against unexpected weakness by accepting a somewhat higher likelihood of stronger outcomes. Translated into monetary policy, this means being more accommodative than usual to provide an extra boost to aggregate demand as a buffer against possible future downside shocks that might otherwise drive us back to the effective lower bound.

Even beyond this asymmetry in costs, I see the distribution of future shocks as skewed in the direction of output running somewhat softer and inflation somewhat lower than what I have written down in my baseline projection. This tilting of the odds strengthens the rationale for shading policy in the direction of accommodation and provides additional support for a gradual path in normalizing policy.

---

<sup>14</sup> For more about the quantitative easing programs (also referred to as large-scale asset purchases) and the rationale behind them, see Board of Governors of the Federal Reserve System (2015).

To sum up, in 2016, I expect growth that is somewhat above trend and further progress in moving inflation toward our 2 percent target. As I consider how to calibrate monetary policy in the months and years ahead, I see two general — but key — considerations to keep in mind: 1) There are a number of downside risks to my near-term forecast; and 2) the equilibrium real federal funds rate is likely lower today than in the past (not only in the short run, as the economy continues to heal from the past wounds, but also in the long run). Today, the confluence of these considerations leads me to conclude that a very shallow path — such as the one envisioned by the median FOMC participant in March — is the most appropriate path for policy normalization over the next three years.

Thank you.

## References

Aaronson, Daniel, and Daniel G. Sullivan, 2002, “Growth in worker quality,” *Chicago Fed Letter*, Federal Reserve Bank of Chicago, No. 174, February, available at <https://www.chicagofed.org/publications/chicago-fed-letter/2002/february-174>.

Board of Governors of the Federal Reserve System, 2015, “What were the Federal Reserve's large-scale asset purchases?,” *Current FAQs*, December 22, available at <https://www.federalreserve.gov/faqs/what-were-the-federal-reserves-large-scale-asset-purchases.htm>.

Byrne, David M., John G. Fernald and Marshall B. Reinsdorf, 2016, “Does the United States have a productivity slowdown or a measurement problem?,” Federal Reserve

Federal Reserve Bank of San Francisco, working paper, No. 2016-03, March, available at <http://www.frbsf.org/economic-research/files/wp2016-03.pdf>.

Federal Open Market Committee, 2016a, Summary of Economic Projections, Washington, DC, March 16, available at <https://www.federalreserve.gov/monetarypolicy/files/fomcprojt160316.pdf>.

Federal Open Market Committee, 2016b, “Statement on longer-run goals and monetary policy strategy,” Washington, DC, as amended effective January 26, available at [https://www.federalreserve.gov/monetarypolicy/files/FOMC\\_LongerRunGoals\\_20160126.pdf](https://www.federalreserve.gov/monetarypolicy/files/FOMC_LongerRunGoals_20160126.pdf).

Federal Open Market Committee, 2012a, press release, Washington, DC, January 25, available at <https://www.federalreserve.gov/newsevents/press/monetary/20120125c.htm>.

Federal Open Market Committee, 2012b, Summary of Economic Projections, Washington, DC, January 25, available at <https://www.federalreserve.gov/monetarypolicy/files/fomcprojt120125.pdf>.

Fernald, John G., 2014, "Productivity and potential output before, during, and after the Great Recession," Federal Reserve Bank of San Francisco, working paper, No. 2014-15, June, available at <http://www.frbsf.org/economic-research/files/wp2014-15.pdf>.

Gordon, Robert J., 2012, "Is U.S. economic growth over? Faltering innovation confronts the six headwinds," National Bureau of Economic Research, No. 18315, August, available at <http://www.nber.org/papers/w18315>.

International Monetary Fund, 2016, "Subdued demand, diminished prospects," *World Economic Outlook Update*, Washington, DC, January 19, available at <http://www.imf.org/external/pubs/ft/weo/2016/update/01/pdf/0116.pdf>.

International Monetary Fund, 2015, "Where are we headed? Perspectives on potential output," in *World Economic Outlook: Uneven Growth — Short- and Long-Term Factors*, Washington, DC, April, pp. 69–110, available at <http://www.imf.org/external/Pubs/ft/weo/2015/01/pdf/c3.pdf>.

Rachel, Lukasz, and Thomas D. Smith, 2015, "Secular drivers of the global real interest rate," Bank of England, staff working paper, No. 571, December, available at <http://www.bankofengland.co.uk/research/Documents/workingpapers/2015/swp571.pdf>.