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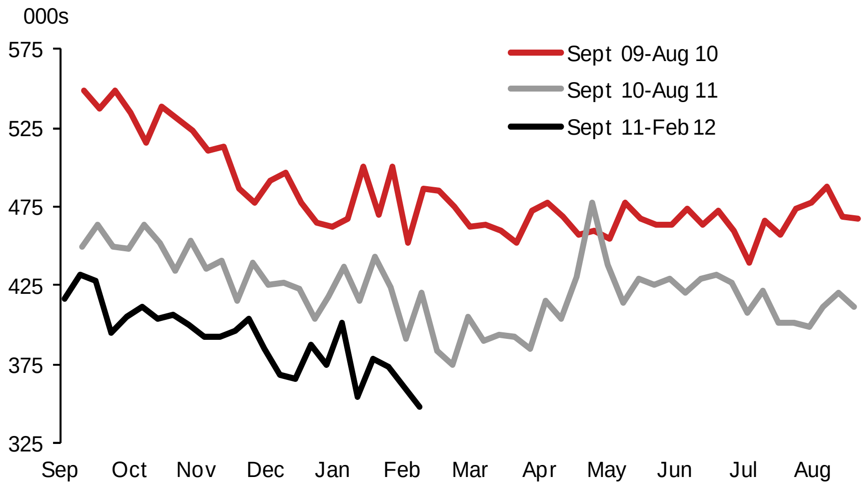
Echo of financial crisis heard in recent jobless claims drop

Only 348k new claims for unemployment insurance were filed in the week ending 11 February, the fewest since March 2008. In the first week of January, 54k more claims (402k) were reported than in the 11 February release. Claims declined materially in February of last year, too – falling from 437k in the first full week of January 2011 to a weekly average of 393k in February. Figure 1 illustrates a common trend over the past three years: claims have fallen from yearly highs marked in August-September to lows in February, only to stagnate in the following months (also see Figure 2). In our view, the downtrend in claims over the past few months is indicative of a gradual improvement in labor market conditions. However, the magnitude of the recent decline is partially attributable to imperfect seasonal adjustments, which have been distorted by the outsized economic shock in 2008-09.

Fig. 1: Seasonally adjusted weekly initial claims for unemployment benefits



Source: Department of Labor, Nomura Global Economics.

To be sure, we are concerned with the optics of economic indicators, i.e., how indicators appear from week-to-week, or month-to-month, and do not intend to discount real economic activity or consequential events (such as the earthquake in Japan) that have impacted the data. In earlier reports, we highlighted the lasting effects of the deep economic contraction in 2008-09 on the seasonality of manufacturing surveys (see "Seasonal bias in sentiment indicators: reduced, but not eliminated", "'Tis the Seasonals", and "Stronger data ahead: explanation and implication"), as well as the unemployment rate ("Stubbornly High and Frustratingly Slow"). In these studies we illustrated the so-called "seasonal bias" by comparing the official seasonally adjusted series with our own adjusted series, which excludes the critical period of September 2008-August 2009 for the purposes of seasonal adjustment. Here, we take a different approach, and bring to light the distorting effects of the 2008-09 financial crisis by showing how it affected data released *prior* to September 2008. The way the deep contraction altered historical jobless claims (via revisions) is an indication of how distorted seasonal factors will affect future jobless claims reports.

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Fig. 2: Jobless claims in February and September

	Monthly prorated jobless claims (000s)	Change (000s)
Sep-09	546	
Feb-10	475	-71
Sep-10	453	-22
Feb-11	393	-60
Sep-11	415	22
Feb-12	355	-60

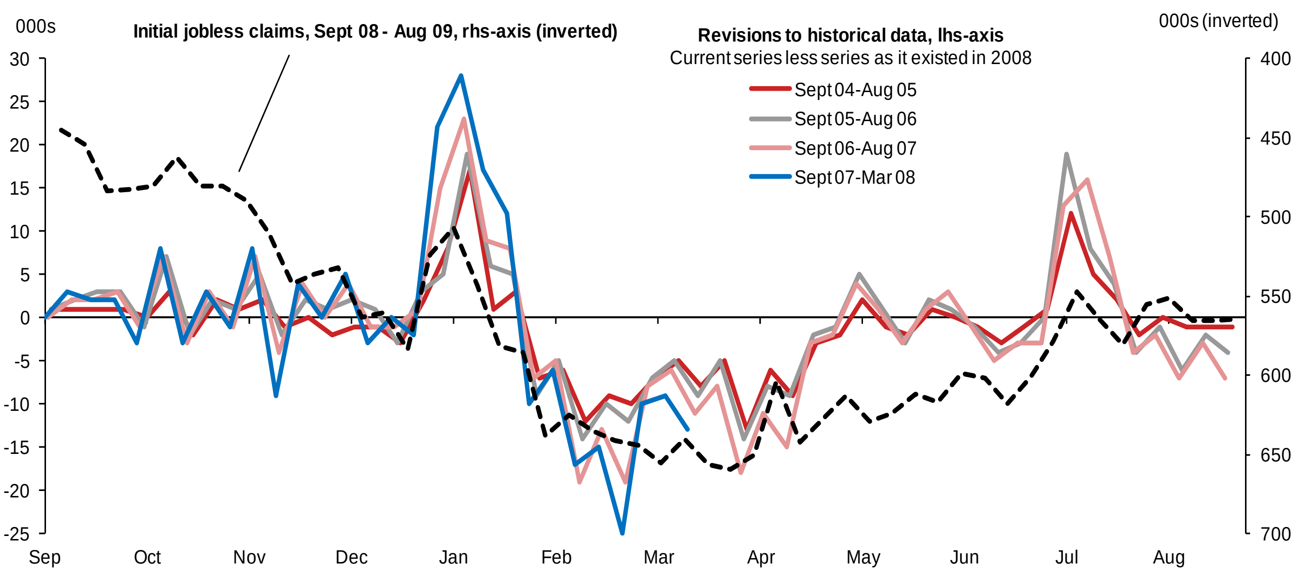
Source: Department of Labor; Nomura.

Macroeconomic volatility alters past and future seasonal adjustment

The volatility of business cycle fluctuations declined drastically in the mid-1980s and remained low by historical standards until the most recent recession. While there is debate over whether the so-called "Great Moderation" ended with the beginning of the recession in December 2007[1], one thing is clear: increased macroeconomic volatility has complicated seasonal adjustment. The purpose of seasonal adjustment is to eliminate predictable seasonal variation and isolate the more consequential, unpredictable elements of a series. In abnormal times, the four components of a series – trend, cyclical, seasonal and irregular – are less discernible through statistical techniques. To illustrate how economic shocks impact historical and future seasonally-adjusted data, we analyzed the effect of a spike in jobless claims comparable to that in 2008-09 on an otherwise predictable series. Then, we seasonally adjust the data to show the how the shock "echoes" through the past, present and future seasonally adjusted series (see Appendix for details).

The "echo" of the recession appears to have changed *actual* seasonally adjusted jobless claims data in the way suggested by the hypothetical analysis. Each year the Department of Labor incorporates new jobless claims data and adjusts historical seasonal factors for the prior five years of the series (most recently in March 2011). Cyclical variation misidentified as seasonality distorts both prior and future seasonal adjustments. Figure 2 shows the difference between the *current* official values of jobless claims for 2004-08 and the *earlier* data (before revisions were released in March 2008). The former series incorporates information over the periods of deep contraction in 2008-09 while the latter does not. The dashed line in Figure 3 shows seasonally adjusted claims from September 2008-August 2009 (note the right-hand scale is inverted). The most striking changes to historical data occur in January (increases) and February-March (decreases). Correspondingly, in January 2009 the number of initial claims slowed from a period of rapid increase in the September-December 2008 period, and then sharply increased again in February 2009.

Fig. 3: The relationship of jobless claims in 2008-09 and revisions to historical data



Note: Historical data are prior to revisions in March 2008; current data are as reported in February 2012.
Source: Department of Labor; Nomura Global Economics.

Rapid declines in jobless claims are unlikely to continue

We expect the US economy to continue to grow at a modest pace in the coming months, but a lesson from the past few years of jobless claims data, as illustrated in Figure 1, is that the February decline should not be expected to persist. And, while our analysis indicates that February-March seasonally adjusted claims are understated, it also suggests overstating in early January. As such, the undistorted trend likely lies

[1] See Todd E. Clark, "Is the Great Moderation Over? An Empirical Analysis," Federal Reserve Bank of Kansas City, *Economic Review*, Q4 2009, pp.5-42.

between the extremes, closer to 370-380k. However, should jobless claims stay near 350k into April and May, this would be indicative of a downtrend (that would exist without the seasonal bias). In the coming months, a 20-30k reversal should be interpreted as jobless claims neither improving nor worsening (although we highlight the reduced utility of using jobless claims to predict other labor market indicators in the current recovery. See US Data Analysis: Jobless claims suggest gradual labor market improvement, 9 February 2012).

Appendix: Testing seasonal adjustment

Seasonal adjustment seeks to separate patterns that recur annually from other fluctuations in economic data. When non-seasonal fluctuations are modest, the standard techniques work well. But large economic shocks can cause distortions. Standard seasonal-adjustment techniques tend to attribute some portion of large economic shocks as a new seasonal pattern. The sharp economic contraction in late 2008 and early 2009 has distorted some economic indicators in this way.

Between mid-2008 and early 2009 initial claims for unemployment rose from less than 400,000 per week to over 650,000 per week. To get a rough idea of how this sort of shock might affect the reported data we have constructed a hypothetical "Test Series" that reflects the pattern and scale of shocks that affected initial claims for unemployment over this period. We then "seasonally adjust" the test series using the standard Census X-12 technique. The test series, before and after adjustment, are shown in Figure 4 and the difference between the two series is shown in Figure 5.

Fig. 4: Hypothetical test series reflecting shocks to initial claims to unemployment

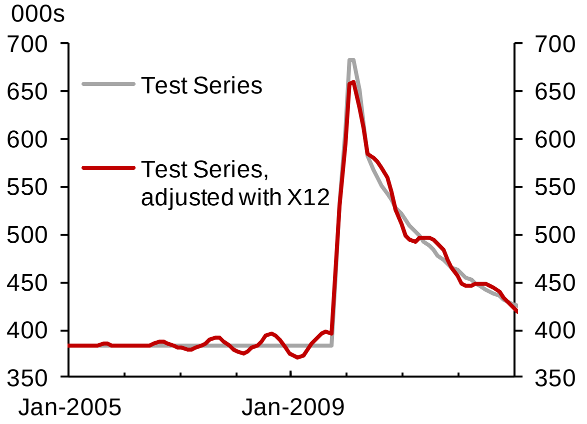
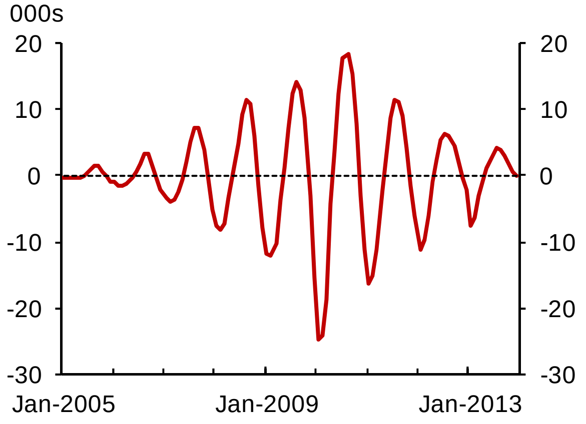


Fig. 5: Impact of seasonal adjustment on the hypothetical test series for initial claims for unemployment



Note: The test series reflects a simple mean-reverting auto-regressive process that was estimated over the period 1975-2012. Significant positive shocks were imposed between Oct-2008 and Jan-2009 and negative shocks were imposed from March 2009 to May 2009. The magnitude of the shocks was set to roughly match the performance of initial claims for unemployment over this period. The test series was then "seasonally adjusted" using Census X-12 with the default settings.

In this hypothetical case, X-12 interprets a portion of the sharp rise and fall of initial claims as a new seasonal pattern. The broad trends of the test series are not affected by adjustment, but the short-term dynamics are distorted. The shocks create a form of inverse echo in the adjusted data. The adjusted series tends to fall more rapidly than the original series over the period September to January, and to decline less rapidly over the period March to June. The effect is greatest in 2008 and 2009, but the distortion extends both forward and backward.

The test series shown in Figures 4 and 5 are just one example. To get a more systematic sense of these effects we constructed a controlled environment in which we could assess the impact of standard seasonal-adjustment techniques in response to large cyclical shocks.

Our general approach was to create simulated data that included known cyclical trends and seasonal effects. We then applied standard seasonal-adjustment techniques to the simulated data and gauged how well those techniques disentangled the known seasonal effects from the cyclical trends (details of these simulations are shown in the box at the end).

The basic results are shown in Figure 6. We considered two different levels of underlying cyclical volatility. The normal monthly volatility of initial claims for unemployment is roughly 19,000, based on a simple mean-reverting auto-regressive process – Equation (1) below – estimated over the period 1977-2011. With this level of cyclical volatility the standard deviation of data adjusted using the Census X-12 technique from underlying cyclical trends is 9,100. The TRAMO-SEATS technique, which is commonly used for seasonal adjustment in Europe, generated a standard deviation of 8,000.[2] We also consider and alternative simulations with half the normal level of underlying cyclical volatility. With this reduced level of cyclical volatility measurement error falls to 5,600 and 5,300, respectively, under X-12 and TRAMO-SEATS.

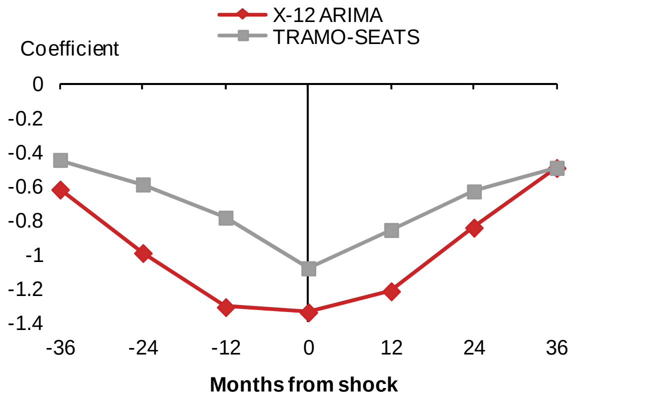
We also used panel regression techniques to analyze how cyclical shocks affect measurement error under seasonal adjustment. In particular, we estimated how cyclical shocks affected measurement error contemporaneously and 1, 2, and 3 years before and after the shocks occurred. The basic regression results are shown in Figure 8. Under both X-12 and TRAMO-SEATS, cyclical shocks affect measurement error in a predictable way. In particular, seasonal adjustment leads to measurement errors with the opposite sign – in other words, a positive cyclical shock will tend to be damped in the adjusted data. Under X-12 a positive 1-standard deviation cyclical shock tended to generate adjusted data that underestimated the true cyclical series by 1,300 (Figure 7). Under TRAMO-SEATS, the effect is somewhat smaller, i.e., a contemporaneous measurement error of -1,100 (also Figure 7).

Fig. 6: Measurement error under different levels of cyclical volatility and alternative seasonal adjustment techniques

	Cyclical shocks	
	Full vol	Half vol
Measurement error (Std. dev, 000s) under:		
X12	9.1	5.6
TRAMO-SEATS	8.0	5.3

Note: Produced from the errors in Equations 4 and 5 (in "Simulation details" below); based on volatility in Equation 2.

Fig. 7: Est. impact of a 1sd cyclical shock on measurement error in seasonally adjusted estimates of initial unemployment claims



Note: See text and Figure 8 for description

Fig. 8: Est. impact of cyclical shocks on measurement error in seasonally adjusted estimates of initial unemployment claims

	X-12 ARIMA	TRAMO-SEATS
	Coefficient (t-stat)	
Constant	-0.43 (-23.6)	-0.57 (-35.0)
Cyclical shock		
3 years before	-0.62 (-32.4)	-0.44 (-26.4)
2 years before	-0.99 (-51.7)	-0.59 (-34.8)
1 year before	-1.32 (-69.2)	-0.79 (-47.1)
Contemporaneou	-1.34 (-70.9)	-1.08 (-64.8)
1 year after	-1.23 (-64.3)	-0.87 (-51.4)
2 years after	-0.84 (-43.8)	-0.63 (-37.1)
3 years after	-0.49 (-25.6)	-0.49 (-29.0)
R-squared	0.07	0.04
Standard error	8.53	7.53

Note: Results from a panel regression where the dependent variables are measurement errors defined in equations (4) and (5) below for X-12 and TRAMO-SEATS, respectively. The independent variables are the shocks used to generate cyclical fluctuations as defined in equation (2) below. Shocks are scaled as standard deviations.

Note that the magnitude of the contemporaneous mismeasurement is not particularly large. In this case a 1sd cyclical shock is 19,000, but the distortions in the adjusted data are projected forward and backward. The results from the panel regression shown in Figures 7 and 8 mimic the pattern in the hypothetical example in Figures 4 and 5. Mismeasurement under seasonal adjustment may actually be more apparent several years after, and before, a large shock when cyclical volatility is much lower.

[2] GÓMEZ, V. and MARAVALL, A. (2001b), "Seasonal Adjustment and Signal Extraction in Economic Time Series", Ch.8 in Peña D., Tiao G.C. and Tsay, R.S. (eds.) A Course in Time Series Analysis, New York: J. Wiley and Sons. and [same authors] (1996), "Programs TRAMO and SEATS. Instructions for the User", (with some updates), Working Paper 9628, Servicio de Estudios, Banco de España.

Key takeaways

The examples analyzed in this appendix are purely hypothetical. The manner in which actual published data are adjusted for seasonal fluctuations is often much more complicated than a simple application of standard techniques with default settings. That said, some important points are worth stressing:

- Economic measurement is never perfect and it is more challenging when economic volatility is high. Moreover, distortions persist. In the wake of the sharp economic fluctuations in 2008 and 2009 measurement error probably remains elevated in much of the economic data we rely on.
- The interaction between large cyclical shocks and standard seasonal-adjustment techniques can lead to persistent distortions in seasonally adjusted data.
- These distortions have little impact on the broad trends apparent in economic statistics. The US economy continues to grow and the pace of activity appears to have picked up in recent months.
- But identifiable distortions in seasonal adjustment can have a material impact on the apparent pace of economic expansion when it is measured over relatively short periods of time, i.e., months or weeks.
- Seasonal adjustment responds to large shocks in predictable ways. Moreover, the effects are projected both forward and backward in the adjusted data. That means it is possible to identify the impact of large shocks on seasonal adjustment by looking at revisions to seasonal adjustment factors for prior periods.
- In the specific case of initial claims for unemployment, we believe that as much as one half of the decline since early January may reflect distortions in seasonal adjustment. Looking ahead, those distortions are likely to be neutral in the next couple of months, and they may be modestly negative in the spring.

(Simulation details below)

Simulation Details

The first step is to estimate a simple dynamic process that captures cyclical fluctuations in initial claims for unemployment.

$$IC_t = \alpha_0 + \alpha_1 IC_{t-1} + \alpha_2 IC_{t-2} + \varepsilon_t \qquad (1)$$

Where:

$IC_t \equiv$ Initial claims for unemployment, monthly, seasonally adjusted.

We then used stochastic simulation to generate 500 projected paths for initial claims for unemployment reflecting only random cyclical shocks. (i= 1 to 500, and t = Jan-1968 to Dec-2011)

$$\widehat{IC}_{i,t} = \hat{\alpha}_0 + \hat{\alpha}_1 \widehat{IC}_{i,t-1} + \hat{\alpha}_2 \widehat{IC}_{i,t-2} + e_{i,t} \qquad (2)$$

Where:

$\widehat{IC}_{i,t} \equiv$ Projected paths for initial claims for unemployment reflecting only cyclical shocks.

$\hat{\alpha}_{0,1,2} \equiv$ Estimated coefficients from Equation (1)

$e_{i,t} \equiv$ Random shocks drawn from the residuals of Equation (1)

We then added seasonal effects to the 500 alternative paths for initial claims for unemployment. The seasonal effects imposed are the implied seasonal factors from published monthly data for initial claims for unemployment.

$$\widehat{ICN}_{i,t} = \widehat{IC}_{i,t} * FAC_t \qquad (3)$$

Where:

$\widehat{ICN}_{i,t} \equiv$ Projected paths for initial claims for unemployment with both cyclical shocks and seasonal effects.

$FAC_t \equiv ICN_t / IC_t$; Seasonal factors from published monthly data.

$ICN_t \equiv$ Initial claims for unemployment, monthly, not seasonally adjusted

We then seasonally adjusted the projected paths, using both Census X-12 and TRAMO-SEATS methods, and compared the resulting adjusted series to original projected paths without seasonal effects. The difference between these two series is measurement error related to the limitations of standard seasonal adjustment techniques in identifying seasonal patterns in volatile economic data.

$$ERR\_X_{i,t} = X12(\widehat{ICN}_{i,t}) - \widehat{IC}_{i,t} \qquad (4)$$
$$ERR\_TS_{i,t} = \text{Tramo} - \text{Seats}(\widehat{ICN}_{i,t}) - \widehat{IC}_{i,t} \qquad (5)$$

Where:

$ERR\_X_{i,t} \equiv$ Measurement error with X-12

$ERR\_TS_{i,t} \equiv$ Measurement error with TRAMO-SEATS

Disclosure Appendix A-1

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