Identifying and Addressing a Break (Blip) in Series

FCSM/WSS Workshop on Quality of Blended Data

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February 26, 2016

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Presentation Outline

- Background on National Crime Victimization Survey (NCVS) sample design and methodology

- 2016 changes to the NCVS*

- Understanding the impact of the changes

- Developing an adjustment vs. declaring a break (blip) in series

- Successfully (or not) communicating break to data users

- Summary/conclusions

*Not related to use of blended data.

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National Crime Victimization Survey (NCVS)

- One of two key measures of crime in the US (with the FBI's Uniform Crime Reports)

- Nationally representative, interview-administered self-report survey conducted continuously since 1973

- Key Goals:
  - Capture the 'dark figure' of unreported crime
  - Obtain information on characteristics of crime victims and incidents

- Data collection agent – US Census Bureau

- Household-based sample - all persons 12 or older in sampled households

  - 135,000 households and 225,000 persons in 2016
  - Excludes homeless, institutional group quarters, military bases

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National Crime Victimization Survey (NCVS)

Sample design – stratified multi-stage cluster sample

- NCVS 2000 design – based on 2000 Census

- NCVS 2010 design – based on 2010 Census

1st stage – stratification and selection of 542 Primary Sampling Units (PSUs)

- Self-representing (SR) and non-self-representing (NSR)

2nd stage – within-PSU address selection

- Geographically sorted; systematic sampling procedure used

- Selected once every 10 years in 2000 design

- Selected annually in 2010 design

3rd stage – within household selection of all persons 12 or older

- 78% household response rate; 84% person

National Crime Victimization Survey (NCVS)

Rotating panel design –

- Sample is divided into 7 groups, each interviewed at 6 month intervals

  - During typical years, at any given time:

    - ~1/7 of sample in Time-In-Sample 1 (TIS1);

    - ~1/7 in TIS2, etc.

- Selected households in sample for 3 years after initial interview

  - After 1st interview, subsequent interviews are bounded by prior interview

  - Bounding adjustment applied to 1st interview data to account for telescoping

Mode –

- By design: 1st interview in person, subsequent over the phone
- Actuality: ~50% in person

National Crime Victimization Survey (NCVS)

NCVS Rotation Chart													
January 2018 - December 2021													
		2014*		2015		2016		2017		2018		2019	2020
Year/Month		J28/K28		J30/K30		J16/K16		J17/K17		J18/K18		J19/K19	J20/K20
2018	JAN	13	14	15	16	17	11	12					
	FEB	23	24	25	26	27	21	22					
	MAR	33	34	35	36	37	31	32					
	APR	43	44	45	46	47	41	42					
	MAY	53	54	55	56	57	51	52					
	JUN	63	64	65	66	67	61	62					
	JUL		14	15	16	17	11	12	13				
	AUG		24	25	26	27	21	22	23				
	SEP		34	35	36	37	31	32	33				
	OCT		44	45	46	47	41	42	43				
	NOV		54	55	56	57	51	52	53				
	DEC		64	65	66	67	61	62	63				
2019	JAN			15	16	17	11	12	13	14			
	FEB			25	26	27	21	22	23	24			
	MAR			35	36	37	31	32	33	34			
	APR			45	46	47	41	42	43	44			
	MAY			55	56	57	51	52	53	54			
	JUN			65	66	67	61	62	63	64			
	JUL				16	17	11	12	13	14	15		
	AUG				26	27	21	22	23	24	25		
	SEP				36	37	31	32	33	34	35		
	OCT				46	47	41	42	43	44	45		
	NOV				56	57	51	52	53	54	55		
	DEC				66	67	61	62	63	64	65		

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2016 NCVS Redesign

Despite sensitivity of victimization estimates to methodological changes, sample redesign was necessary.

Need for redesign:

1. Routine decennial sample update to account for population shifts

   - Moving from 2000 to 2010 design

2. Expansion and reallocation of sample to enable state-level estimation in 22 largest states

Phase in began Jan 1, 2015; completed Dec 31, 2017

2016 NCVS Redesign

3 types of counties in 2016 sample:

    1. Continuing – included in both 2000 and 2010 designs

    2. New – in 2010 design sample

    3. Outgoing – part of 2000 design but not 2010 design

Timeline

2015 – new addresses added to continuing counties; outgoing counties phased out

2016 – new counties added

2017 – remaining 2000 sample addresses in continuing counties phased out

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2016 NCVS Redesign

Impact of Sample Redesign

	2015	2016
Household sample size	96,000	135,000
Person sample size	164,000	225,000
% TIS 1 households	18%	34%
% Households with new interviewers (FRs)*	7%	19%
Continuing areas	860	505
New areas	319	428

*Defined as working on NCVS < 6 months.

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2016 NCVS Redesign

Potential Impact on Victimization Estimates:

- Previously documented "New" FR effect in NCVS

  - 2006 Redesign – new areas were predominately rural with new FRs hired to conduct the interviews

    - Violent crime rates were 33% higher in new areas compared to outgoing areas

  - 2011 Refresher Training – newly trained FRs had higher numbers of crimes per interviewed persons than cohort of 'untrained' FRs

- New FR effect identified in other collections as well.

  - Eg. HHS National Survey of Drug Use and Health – increase in substance abuse rates following sample redesign and introduction of new FRs

2016 NCVS Redesign

Potential Impact on Victimization Estimates:

- New Household effects
  - TIS 1 households/persons report more incidents than in TIS 2-7
    - Telescoping – pulling in crimes from beyond 6 month reference period
    - Learning – develop an understanding of the types of incidents that are in scope for the survey
    - Fatigue – affirmative answers to crime screener questions results in a longer interview
- New area effects
  - Characteristics of new areas associated with higher or lower crime than outgoing areas

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Impact on estimates – 2015 v. 2016 (half)

Estimate Type	Direction of change	Significant Difference?
P-Male	⬆	Y
P-Female	⬇	N
P-Age 12-24	⬆	N
P-Age 25-49	⬆	Y
P-Age 50+	⬇	N
P-Black only	⬇	N
P-Not Black only	⬆	Y
P-Hispanic	⬆	N
P-Non-Hispanic	⬆	Y
P-Divorced/separated/never married	⬆	N
P-Married/widowed	⬆	Y
P-HHIncome = low	⬆	N
P-HHIncome = med	⬆	N
P-HHIncome = high	⬆	Y
P-MSA Stat = Urban	⬆	Y
P-MSA Stat = Suburban	⬆	N
P-MSA Stat = Rural	⬆	Y
P-Reported to police	⬆	N
P-Not reported to police	⬆	Y
P-All Persons	⬆	Y

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Impact on estimates – half year

Examining estimates by FR experience and TIS

- Regardless of year, higher rates of violence among new FRs than experienced FRs
- Higher rates for TIS 1 households in 2016, compared to TIS 2-7
- New Households/FRs contribute substantially more to 2016 rates
- No significant change from 2015 to 2016 among experienced FRs, regardless of TIS

Actual TIS	FR experience	TIS Sample %		FR Sample %		Violent crime rate	
		2015	2016(h)	2015	2016(h)	2015	2016(h)
1	Experienced	16%	30%	89%	58%	17.1	18.8
1	New	2%	22%	11%	42%	38.3	35.3
1	Total	18%	53%	100%	100%	19.3	25.4
2 - 7	Experienced	77%	42%	94%	90%	17.8	16.7
2 - 7	New	5%	5%	6%	10%	29.1	45.1
2 - 7	Total	82%	47%	100%	100%	18.4	19.5
Overall total		100%	100%			18.6	22.0

Estimates are weighted with bounding and TIS adjustments applied.

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Prior approach to addressing similar issues

New FR effects –

- 2006 Sample Redesign – treated as a break in series; change estimates shown for urban and suburban areas only

- 2011 Refresher Training – cases handled by Cohort 1 trained FRs thrown out

  - Not an option in 2016 because new households w/new FRs needed for state estimates

New Household effects –

- Bounding adjustment applied to TIS 1 households

- Time-In-Sample adjustment applied to account for new households introduced to each of the seven interview waves

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Alternative 2016 option – Adjustment factor

Adjustment factor based on differences between 2016 and 2015 sample distributions

Considerations

1. New FRs and new households also more likely to be in new areas – could different household characteristics or levels of risk account for 'real' differences in crime rates?

2. How to define FR experience

3. Challenges with explaining adjustment/no clear basis for adjusting

   - Potential for 2016 rates to be more accurate

     - Collected from better performing FRs & non-fatigued households

   - No external sources to benchmark to-

     - UCR and NCVS have historical patterns of both divergences and convergences

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Alternative 2016 option – Applying adjustment

Addressing Consideration 1 – BJS, Census, external contractor

Controlling for FR experience and TIS, other factors related to likelihood of reporting a crime

| NCVS Crime Prediction Model Effects for 2016					
		FULL YEAR			
		Property Crimes		**Violent Crimes**	
Variable	df	F value	p-value	F value	p-value
FR Experience	2	41.2	<.0001	15.0	<.0001
Actual TIS	6	13.5	<.0001	8.5	<.0001
FR Experience by Actual TIS	12	2.4	0.0035	2.8	0.0007
Race (black-only or not)*	1	11.8	0.0006	1.3	0.2623
Household Income	2	21.3	<.0001	54.2	<.0001
CBSA/MSA Status	2	56.9	<.0001	19.6	<.0001
State	50	10.8	<.0001	373.5	<.0001
Urban/Rural Status	1	54.3	<.0001	19.4	<.0001
New PSU Status	1	7.6	0.0057	10.2	0.0014
Source: US Census Bureau, 2016 NCVS Internal Household-level Files					
Table Note: *For property crimes, this is the household reference person race.					

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Alternative 2016 option – Applying adjustment

Addressing Consideration 1 – BJS, Census, external contractor

- Examined differences in person/household characteristics, incidents, and new/outgoing areas by FR experience

    - Inconsistent findings

- Attempted to isolate new area effects from new FR effects

    - Inconsistent findings

- Assessed duration of new FR effects

    - Inconsistent findings

    - Unable to define experience based on number of interviews conducted rather than time served

Alternative 2016 option – Applying adjustment

- Assessing duration of new FR effect.
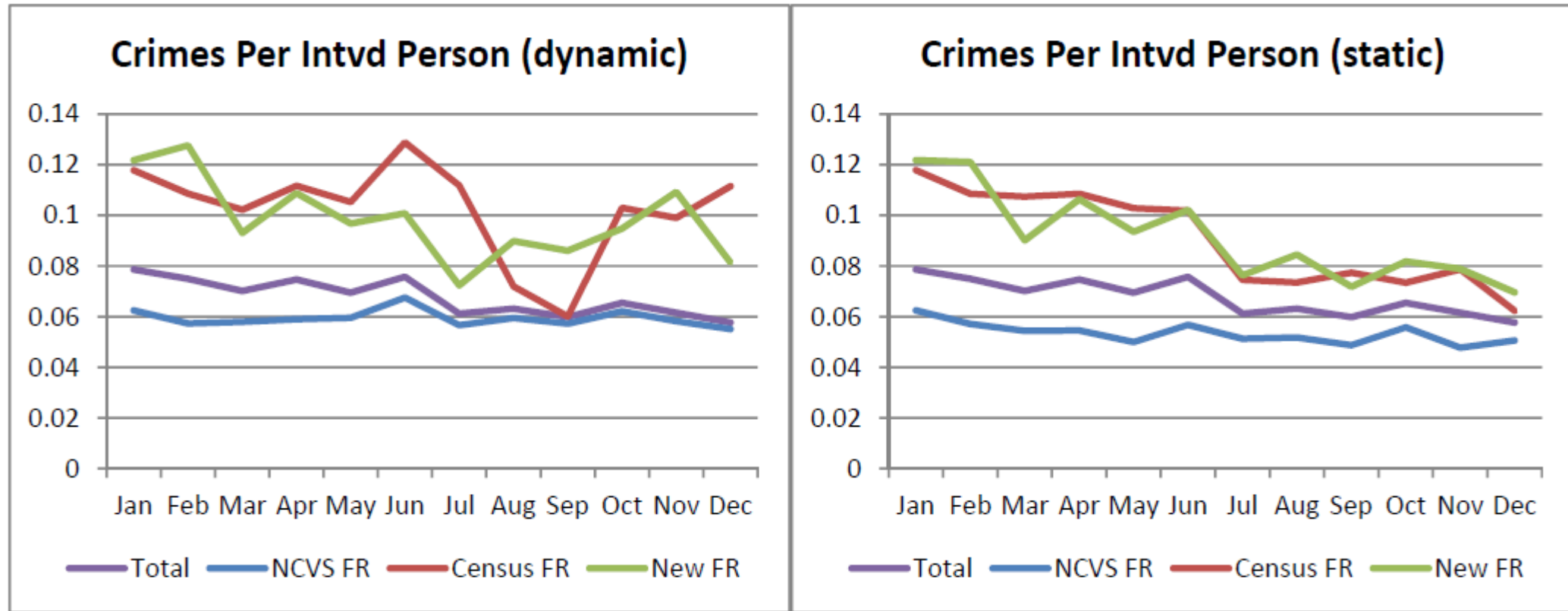
Alternative 2016 option – Applying adjustment

Additional consideration –

- 2017 sample distributions expected to return to 'normal' levels

  - Redesign impact isolated to 2016

  - Potential for comparison of 2017 rates to 2015 rates for change estimates

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BJS Decision – Blip in Series

- Data released with no adjustment

- Annual *Criminal Victimization* report focused on 2016 victimization patterns

- Impact of redesign explained through presentation of rates for continuing counties vs. new/outgoing counties

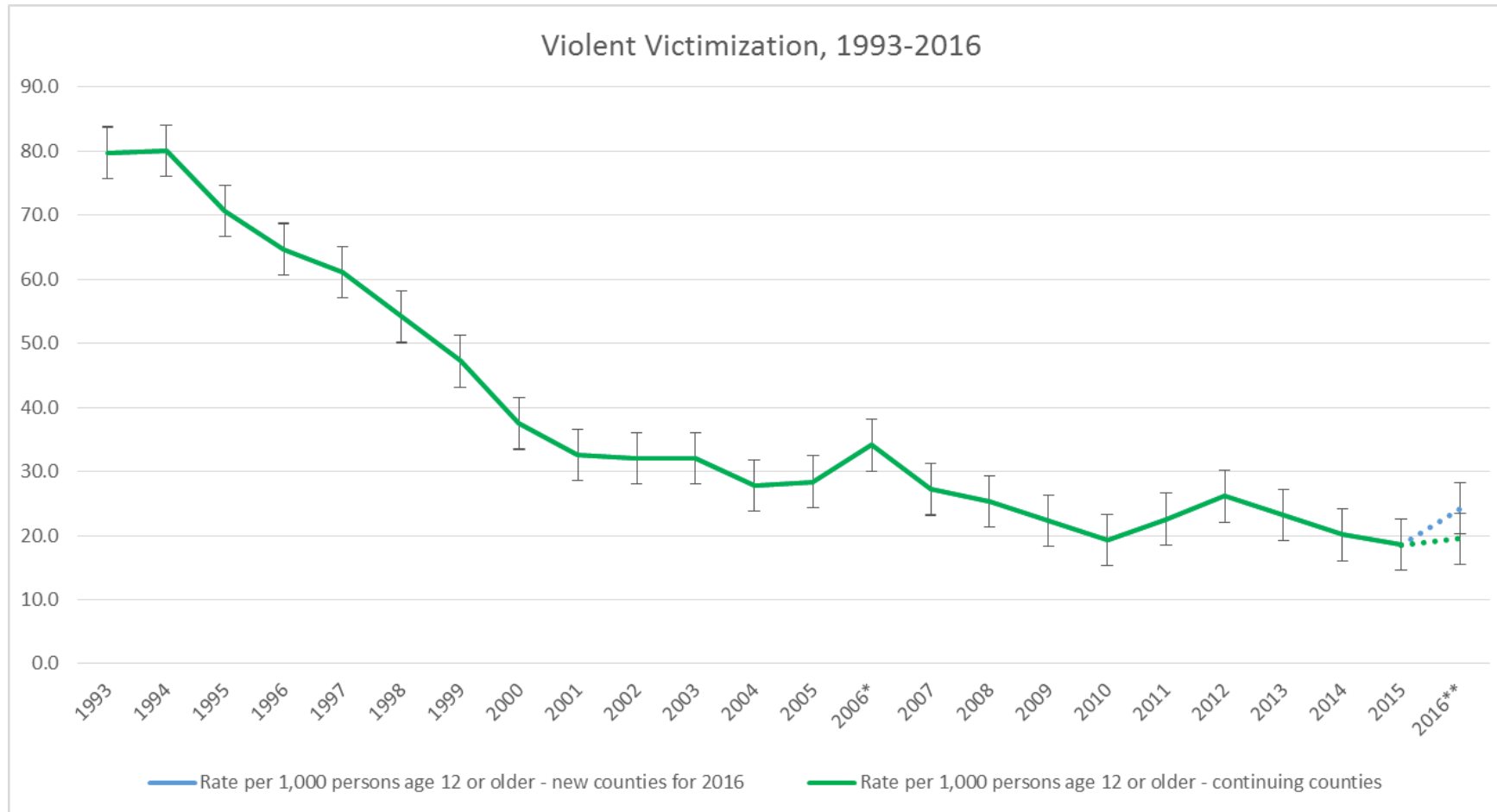 - No statistically significant change in rates in continuing counties

	Continuing NCVS sample counties		Outgoing NCVS sample counties/new NCVS sample counties		
	2015*	**2016**	**2015 Outgoing**	**2016 New**	
Type of crime	Rate per 1,000 persons age 12 or older				
Total violent crime	18.7	19.5	18.3	24.2	†
Serious violent crime	7.3	6.8	5.2	7.5	†
Total property crime	108.1	113.9	118.6	130.0	

†Significant change from comparison year at 95% confidence level.

- Text box on redesign presented on page 2 of report

BJS Decision – Blip in Series

Even with the highest possible 2016 estimate, not a major spike in crime

Violent Victimization, 1993-2016

Rate per 1,000 persons age 12 or older - new counties for 2016

Rate per 1,000 persons age 12 or older - continuing counties

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BJS Decision – Blip in Series

- Response to *Criminal Victimization, 2016* – mixed

- BJS continues to examine possibility of providing data users with an adjustment factor to use for trend analysis

- Monitoring 2017 sample distributions to assess comparability of 2015 and 2017
  - What is an acceptable level of variation in distributions?

Addressing FR effects and household fatigue

NCVS redesign

- Overhaul of survey instrument to modernize, streamline, increase utility
  - Instrument last redesigned in 1993
- Moving to a self-administered mode
  - Reduced FR effects, improved privacy, reduced cost
- Reducing number of interview waves to 4
- Challenges and drawbacks to each of these changes, including the impact on the time series

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Final Thoughts

- Would 2016 have been handled the same way even if data didn't show an increase in crime – YES
  - Based on full year of data, 2015 to 2016 increase barely significant at 90%
- Sample redesign impacts were not unexpected – what to do to mitigate impact of methodological changes ahead of time
  - Weighing the financial costs of these options against the cost of a break in series
- Weighing the value of and need for routine survey improvements against the potential for a break in series

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