

Artisanal Mining and Intimate Partner Violence in Sub-Saharan Africa

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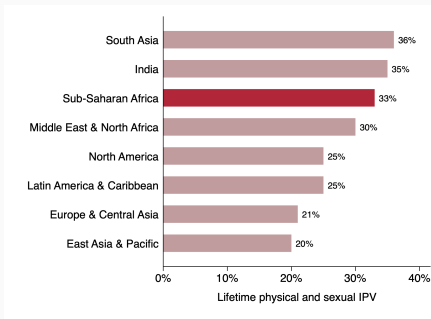
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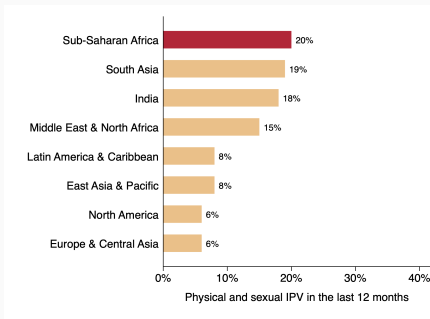
Motivation: IPV is prevalent in SSA

- In addition to human right violation, IPV has adverse effects on women's **physical and psychological and mental health**: injury, STIs/HIV, reproductive disorder, suicidal ideation (Cools and Kotsadam 2017, Epstein et al. 2020)
- SSA is a leading region in IPV

(a) Lifetime IPV



(b) IPV in the last 12 months



Source: World Health Organization (WHO, 2000-2018). <https://vaw-data.srhr.org/data>.

Motivation: Africa is natural resource abundant

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- 42 out of 54 African countries are characterized as resource-dependent
- Thus, natural resource shock is the most relevant economic shock in this context

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ASM is different from ISM

- Large number of **artisanal miners** – about 10 million – with at least a further 60 million reliant on the sector in SSA (World Bank 2019)
- 40-50% of ASM workforce is women in Africa (ASM Inventory 2022, Eshun 2020)
 - ▶ mainly employed in crushing, washing, sorting, mercury-gold amalgamation, providing goods and services

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ASM's impact on violence against women is ambiguous:

- ↑ women's bargaining power → ↓ violence, or ↑ violence via **backlash effect**
- ↑ hyper-masculine culture of mining communities → ↑ violence
- ↑ household wealth → ↓ violence
- ↑ endogenous match quality → ↓ violence
- ↑ men (women) in-migration → ↑ (↓) violence

Mining impacts

- Macro (Sachs and Warner 2001, Frankel 2012, etc.)
- Micro (Berman et al. 2017, Benshaul-Tolonen 2019, etc.)

Micro effects of industrial mining

- Structural transformation (Aragón and Rud 2013, Kotsadam and Tolonen 2016, Fafchamps et al. 2017)
- Male and female employment (Kotsadam and Tolonen 2016, Santos 2018)
- Acceptance of domestic violence (Guimbeau et al. 2023)
- Domestic violence or IPV (Kotsadam et al. 2017)

Micro effects of artisanal mining

- Gender- and industry-specific employment (Gräser 2023, Girard et al. 2023)
- Deforestation and household wealth (Girard et al. 2023)
- Sexual violence by armed groups (Fourati et al. 2021, Rustad et al. 2016)
- No study examined IPV against women

Research questions:

- How does artisanal mining affect IPV against women?
 - ▶ We focus on **gold**: the main form of ASM (Hilson 2016)
 - ▶ SSA generates 20% of the world's gold production (Signé and Johnson 2021)
- What are the dominating forces or mechanisms?

Research questions:

- How does artisanal mining affect IPV against women?
 - ▶ We focus on **gold**: the main form of ASM (Hilson 2016)
 - ▶ SSA generates 20% of the world's gold production (Signé and Johnson 2021)
- What are the dominating forces or mechanisms?

This study aims to:

- Provide the first evidence on the causal effects of artisanal mining on IPV against women by estimating the impact of ASM on different types of IPVs with different frequencies
- Analyze the persistence of contemporaneous impacts of ASM on IPV to provide new insights on the dynamic effects in the long run
- Draw policy lessons for other developing countries for empowering women

1. Data
2. Empirical Strategy
3. Results
4. Conclusion

Data

Outcome variables and controls from DHS for all countries in Sub-Saharan Africa (over 30 countries, 1990-2019)

- Primary: Women's experience of different types of IPVs with different frequencies
- Secondary: Intrahousehold decision-making, gender-specific sectoral emp., etc.
- Controls: Individual and household characteristics

Spatial variation: Geographic info. on **gold suitability**, covering the **entire Africa** (Girard et al. 2023)

- Coordinates of gold suitable bedrocks for PRIO-GRID 0.5×0.5 degree grid cells
- Construct binary and continuous measures for each cell's gold suitability

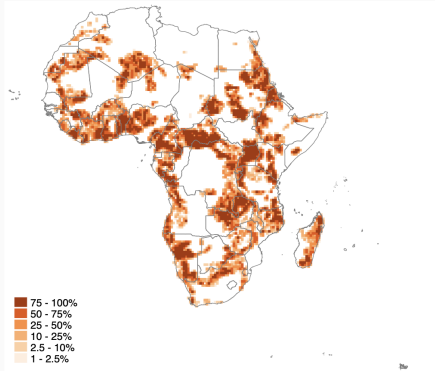
Temporal variation: International gold prices over time between 1990-2019 from the World Bank Pink Sheet

Industrial gold mining (Berman et al. 2017, RMD-IntierraRMG, 1997-2010)

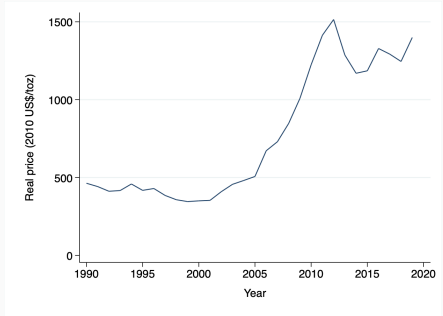
- A dummy variable indicating whether a cell has industrial mines of gold
- Critical to isolate the impact of artisanal gold mining (**registered** and **unregistered**)

Data Patterns

(a) % of the cell area suitable for gold



(b) Global price of gold



Notes: Panel (a) depicts the percentage of areas suitable for artisanal gold mining in the PRIO-Grid cells of 0.5×0.5 degrees or 55×55 kilometers at the Equator, and panel (b) shows the annual average price of gold (in 2010 US\$/troy ounce) at the international market between 1990 and 2019.

Empirical Strategy

Empirical specification (following Girard et al. 2023):

$$\text{IPV}_{ict} = \beta_0 + \beta_1 \text{Gold Suitability}_c \times \text{Gold Price}_{t-1} + \\ + \mathbf{X}'_{ict}\boldsymbol{\gamma} + \mathbf{Z}'_{hct}\boldsymbol{\theta} + \mathbf{M}'_{ct}\boldsymbol{\delta} + \alpha_c + \pi_{country,t} + \varepsilon_{ict}, \quad (1)$$

where

- IPV_{ict} : One of the IPV outcomes for individual i living in cell c at survey year t
- $\text{Gold Suitability}_c$: Either a dummy or continuous variable of gold suitability for cell c
- Gold Price_{t-1} : International gold price at $t - 1$
- \mathbf{X}_{ict} : Woman i 's characteristics (age, education, marital status, and religion)
- \mathbf{Z}_{hct} : Household characteristics (place of residence and household size)
- \mathbf{M}_{ct} : Cell-level factors (ISM, agricultural potential, and weather conditions)
- α_c and $\pi_{country,t}$: Cell fixed effects and country-by-year fixed effect, respectively

Potential Identification Concerns

Key assumption

- International gold price is exogenous to the local market

Attenuation bias

- Some cells treated as suitable for gold might not be suitable because the river could have carried out the ores of gold
 - ▶ We thus interpret the estimated effects as lower-bound
- Gold-suitable cells might not practically posit any gold, or the gold in the cells might not be reachable
- Gold-suitable cells with gold at some period could run out of gold in the subsequent periods
 - ▶ Thus, our estimates are likely biased towards zero
- Random displacement of PSUs in the DHS

Measurement error in IPV

- Women might report more violence as their relative economic conditions improve
- But the estimated effects was found to be lower-bounds estimates

Results

Main results: ASgM Effects on IPV (broad categories)

	Dependent variable: A dummy variable for intimate partner violence (IPV)			
	(1) Overall IPV	(2) Less severe physical IPV	(3) Severe physical IPV	(4) Sexual IPV
Panel A. Ever in the last 12 months				
Gold suitable × Gold price	-0.109*** (0.039)	-0.094** (0.039)	-0.023 (0.034)	-0.046 (0.045)
Observations	69990	69987	69979	69972
R ²	0.18	0.17	0.12	0.13
Panel B. Sometimes				
Gold suitable × Gold price	-0.120*** (0.043)	-0.100** (0.043)	-0.051 (0.031)	-0.030 (0.039)
Observations	69813	68275	69478	68665
R ²	0.21	0.17	0.14	0.12
Panel C. Often				
Gold suitable × Gold price	-0.010 (0.029)	-0.011 (0.025)	0.009 (0.018)	-0.023 (0.028)
Observations	69840	67703	69250	67516
R ²	0.20	0.21	0.09	0.11

Main takeaways:

- ASgM ⇒ Overall IPV with **less frequency** ↓, particularly **less severe physical** IPV
- No effect on (i) **severe physical** and (ii) **sexual** IPVs
- No effect on any type of IPVs **often** experienced in the last 12 months

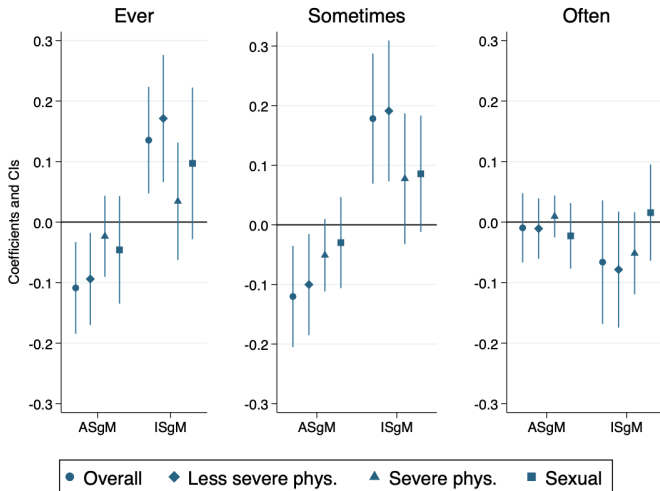
Main results: ASgM Effects on IPV (detailed categories)

	Dependent variable: A dummy variable for intimate partner violence (IPV)				
	Less severe physical		Sev. phys.	Sexual	
	(1) Slapped	(2) Punch with fist or hit by sth. harmful	(3) Threatened with knife or other weapons	(4) Physically forced into unwanted sex	(5) Forced into other unwanted sexual acts
Panel A. Ever in the last 12 months					
Gold suitable × Gold price	-0.081** (0.039)	-0.063* (0.032)	-0.026 (0.023)	-0.060 (0.043)	0.100*** (0.029)
Observations	69959	69921	64505	69947	66091
R ²	0.15	0.09	0.07	0.12	0.10
Panel B. Sometimes					
Gold suitable × Gold price	-0.096** (0.049)	-0.088*** (0.028)	-0.032* (0.019)	-0.038 (0.039)	0.065** (0.026)
Observations	61680	65880	63516	64561	64004
R ²	0.16	0.09	0.05	0.12	0.09
Panel C. Often					
Gold suitable × Gold price	-0.078** (0.036)	0.001 (0.020)	-0.005 (0.015)	-0.050* (0.030)	0.038** (0.018)
Observations	43102	60325	62618	57266	61709
R ²	0.23	0.13	0.08	0.12	0.08

Main takeaways:

- Likelihood of women being (i) slapped and (ii) punched with a fist or hit by something harmful drives the IPV-reducing impact
- Prob. of women being forced into sexual acts other than sex is strongly ↑ (Rustad et al. 2016, Kotsadam et al. 2017, Fourati et al. 2022)

Main results: Effects of ASgM and ISgM on IPV (broad categories)



Mechanisms: Women's Intrahousehold Bargaining Power

	(1) Aggregate index 1	(2) Aggregate index 2	(3) Own money	(4) Own health	(5) Large purchase	(6) Daily purchase	(7) Visit	(8) Cook	(9) Husband money
Gold suitable \times Gold price	0.059*** (0.016)	0.071*** (0.020)	0.018 (0.018)	0.063*** (0.023)	0.054** (0.022)	0.093** (0.036)	0.097*** (0.027)	0.039 (0.043)	-0.011 (0.038)
Observations	601189	598713	280025	594362	598571	233360	598556	134210	467840
R^2	0.35	0.34	0.12	0.28	0.27	0.30	0.24	0.19	0.28

Main takeaways:

- Women's bargaining power within the household \uparrow
- Bargaining power channel dominates the backlash effect

Mechanisms: Sectoral Employment by Gender

	Dependent variable: A dummy variable for employment				
	(1) All	(2) Mining	(3) Agriculture	(4) Services	(5) Sales
Panel A. Men					
Gold suitable \times Gold price	-0.007 (0.004)	0.012** (0.005)	-0.034** (0.015)	-0.017* (0.010)	0.004 (0.010)
Observations	658986	516913	640177	624925	624925
R ²	0.08	0.08	0.36	0.08	0.09
Panel B. Women					
Gold suitable \times Gold price	-0.015 (0.020)	0.023*** (0.006)	-0.034* (0.021)	-0.016 (0.011)	0.037* (0.022)
Observations	690121	398605	482918	483692	483692
R ²	0.20	0.09	0.44	0.14	0.28

Main takeaways:

- No effect on overall employment for both men and women
 - Employment itself is not the main channel
- Employment in mining \uparrow (magnitude for women is twice as much as for men)
- Employment in sales/retail weakly \uparrow for women only
- Employment in agriculture \downarrow for both men and women (same magnitude)

Mechanisms: Improvement in Individual Earnings

- Household wealth increases due to ASgM in SSA (Girard et al. 2023)

	Dependent variable: Household wealth index, standardized				
	(1)	(2)	(3)	(4)	(5)
Gold suitable \times Gold price (lag 1)	0.090** (0.043)				0.088** (0.043)
Gold suitable \times Log price		0.069** (0.030)			
Gold suitable \times Current price			0.094* (0.048)		
Gold suitable dummy \times Gold price				0.066** (0.031)	
Industrial gold mining \times Gold price	0.166*** (0.056)	0.163*** (0.056)	0.141*** (0.055)	0.161*** (0.057)	
Industrial mineral mining \times Mineral price					0.158*** (0.048)
Observations	552088	552088	651510	552088	554109
R^2	0.65	0.65	0.62	0.65	0.65

Main takeaway (combined with employment effects):

- Possible channel: Women's relative earning from mining and retail/sales industries
 $\uparrow \Rightarrow$ Women's bargaining power \uparrow

Mechanisms: Improvement in Household Wealth

	Dependent variable: A dummy variable for intimate partner violence (IPV)			
	(1) Overall IPV	(2) Less severe physical IPV	(3) Severe physical IPV	(4) Sexual IPV
Panel A. Ever in the last 12 months				
Gold suitable \times Gold price	-0.106*** (0.039)	-0.091** (0.039)	-0.022 (0.034)	-0.044 (0.045)
Household wealth	-0.027*** (0.003)	-0.031*** (0.003)	-0.016*** (0.003)	-0.018*** (0.003)
Observations	69990	69987	69979	69972
R^2	0.18	0.17	0.13	0.13
Panel B. Sometimes				
Gold suitable \times Gold price	-0.118*** (0.044)	-0.098** (0.043)	-0.050 (0.031)	-0.029 (0.039)
Household wealth	-0.020*** (0.003)	-0.025*** (0.003)	-0.010*** (0.003)	-0.008*** (0.003)
Observations	69813	68275	69478	68665
R^2	0.21	0.17	0.14	0.12
Panel C. Often				
Gold suitable \times Gold price	-0.008 (0.029)	-0.009 (0.025)	0.010 (0.018)	-0.021 (0.027)
Household wealth	-0.022*** (0.003)	-0.016*** (0.002)	-0.010*** (0.002)	-0.015*** (0.002)
Observations	69840	67703	69250	67516
R^2	0.20	0.21	0.09	0.11

- ASM effect on IPV does not transmit through improvement in household wealth

Mechanisms: Changes in the Compositions

	Dependent variable: Observable characteristics						
	(1) Age	(2) Non-mover	(3) Never married	(4) Married	(5) Living together	(6) Divorced	(7) Household size
Gold suitable \times Gold price	-0.180 (0.181)	-0.028 (0.031)	0.003 (0.008)	0.012 (0.013)	-0.024** (0.012)	-0.002 (0.002)	-0.005 (0.019)
Observations	957053	564907	944670	944670	944670	944670	957053
R^2	0.10	0.16	0.38	0.29	0.16	0.03	0.23

Main takeaway:

- Changes in compositions of mining community due to ASM are not likely the driving forces of the ASM effects
 - ▶ as women's various observable characteristics do not respond to ASM, except for a dummy for living together
- A potential incarceration effect due to not living together

Mechanisms: In-migration of women

	Dependent variable: Migration status				
	(1)	(2)	(3)	(4)	(5)
	Less than 1 year	1 year	2 years	3 years	4 years
Gold suitable \times Gold price	0.013** (0.006)	0.011 (0.009)	0.011 (0.012)	0.010 (0.015)	0.008 (0.017)
Observations	944687	944687	944687	944687	944687
R^2	0.06	0.10	0.13	0.17	0.19

Main takeaway:

- Increase in newly settled (less than 1 year) migrant women

Place of residence

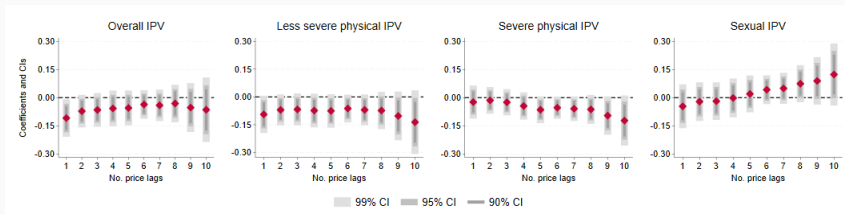
- Intimate partner violence [» Broad categories](#) [» Detailed categories](#)
 - ▶ Overall and less severe physical IPV **ever** and **sometimes** experienced in the last 12 months ↓ (rural areas)
 - ▶ No impact of on any of the IPVs **often** experienced in either rural or urban areas

Woman's age (15-25, 26-35, 36-49)

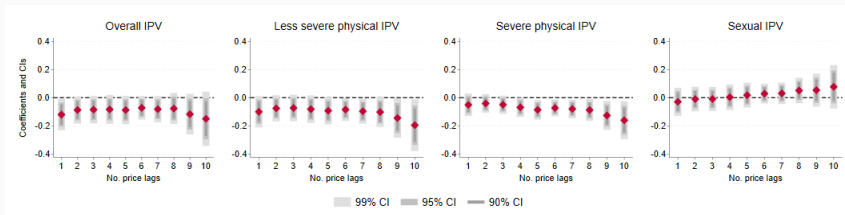
- Intimate partner violence [» Broad categories](#) [» Detailed categories](#)
 - ▶ Overall and less severe physical IPV **ever** and **sometimes** experienced in the last 12 months ↓ (women in the middle age group, 26-35 years old)
 - ▶ No impact on any of the IPVs **often** experienced in the last 12 months, except for IPV of being slapped (↓) and being forced into other unwanted sexual acts (↑) among older women

Persistence of the ASgM Effects on IPV: Broad Categories

(a) Ever in the last 12 months



(b) Sometimes



Main takeaways:

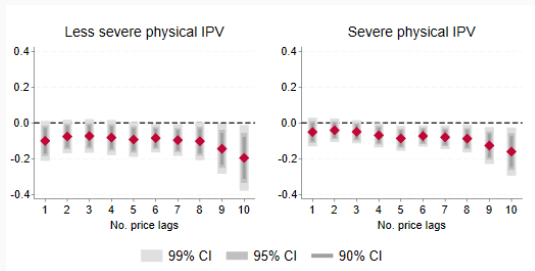
- ↓ in **less severe** physical IPV experienced **sometimes** sustains in the long run
- Null effect on **severe** physical IPV turns negative in the long run

►► Often

►► Detailed cat.

Persistence of the ASgM Effects on IPV: Broad Categories

(a) Sometimes



Main takeaways:

- ↓ in **less severe** physical IPV experienced **sometimes** sustains in the long run
- Null effect on **severe** physical IPV turns negative in the long run

► Detailed cat.

► Often

- Gold suitability dummy
 - ▶ » Broad categories » Detailed categories
- Alternative gold prices: (i) Log price and (ii) current price
 - ▶ » Broad categories » Detailed categories (log price) » Detailed categories (current price)
- Industrial mineral mining (Industrial mining \times Mineral price)
 - ▶ » Broad categories » Detailed categories
- Controlling for temperature-induced push factor
 - ▶ » Broad categories » Detailed categories

Conclusion

To recap:

- We provide the first evidence on the impact of artisanal mining on intimate partner violence against women + the persistence of ASgM effects
- Artisanal mining reduces **less severe** and **less frequent physical** violence
 - ▶ Main channel: ↑ in women's bargaining power due to their higher income from mining and services/sales activities relative to husbands
- However, artisanal mining increases specific type of **sexual** violence
 - ▶ Possible channels (on-going work): Fertility decisions and match quality

To recap:

- We provide the first evidence on the impact of artisanal mining on intimate partner violence against women + the persistence of ASgM effects
- Artisanal mining reduces **less severe** and **less frequent physical** violence
 - ▶ Main channel: ↑ in women's bargaining power due to their higher income from mining and services/sales activities relative to husbands
- However, artisanal mining increases specific type of **sexual** violence
 - ▶ Possible channels (on-going work): Fertility decisions and match quality

Caveats for future research:

- Use better employment data to further explore the employment effects (e.g., intensive margin)
- Explore data on individual-level earnings to explicitly examine a mechanism via gender-specific earnings
- Study other socio-economic issues using the artisanal mining shock

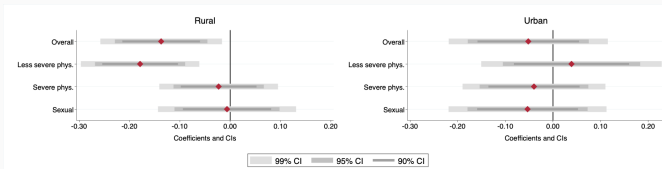
Thank you!

Email: tb497@cornell.edu

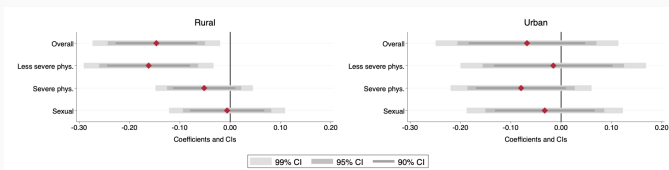
Heterogeneity by Place of Residence: IPV (broad categories)

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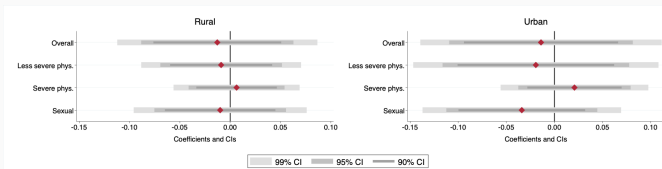
(a) Ever in the last 12 months



(b) Sometimes



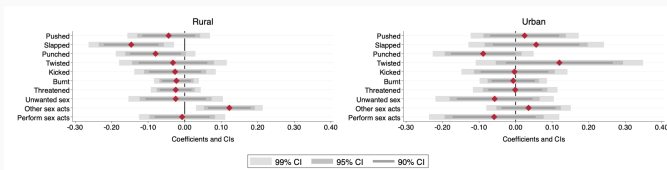
(c) Often



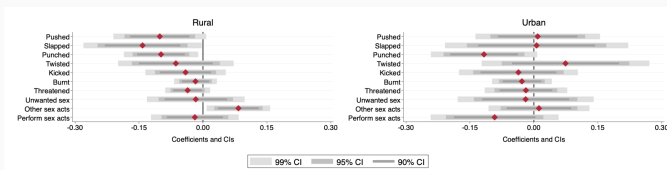
Heterogeneity by Place of Residence: IPV (detailed categories)

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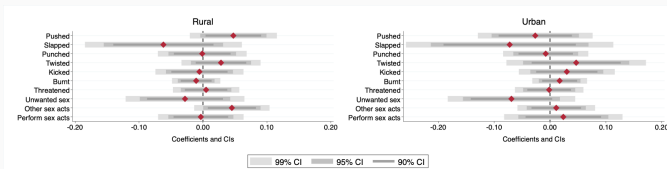
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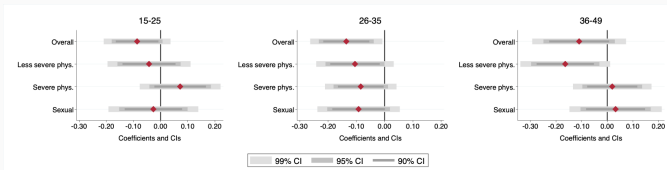
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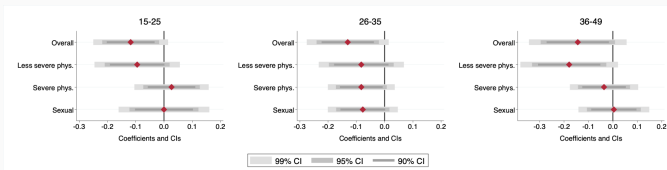
Heterogeneity by Woman's Age: IPV (broad categories)

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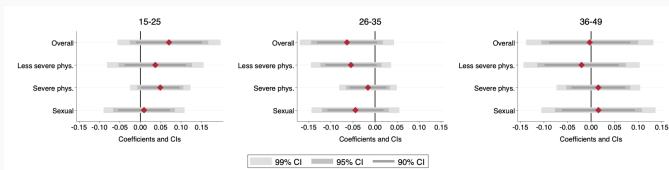
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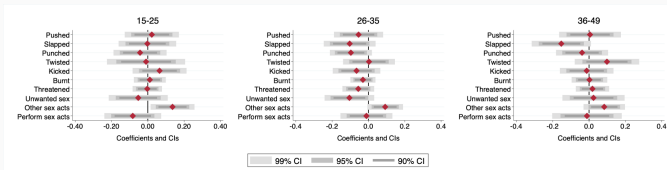


(c) Often

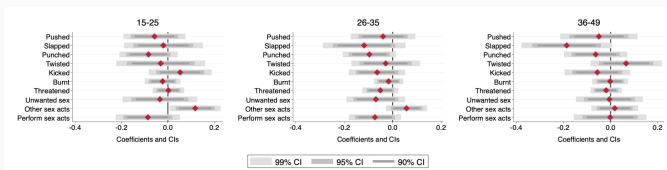


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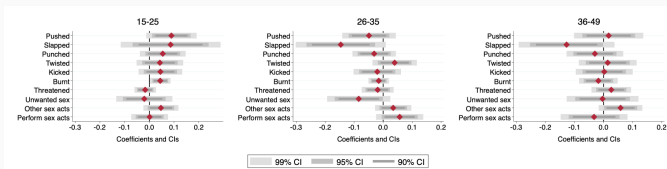
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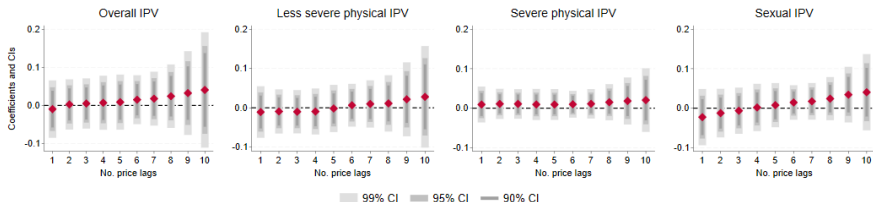
(b) Sometimes



(c) Often



Persistence of the Contemporaneous Effects on IPV-Often: Broad Cat.



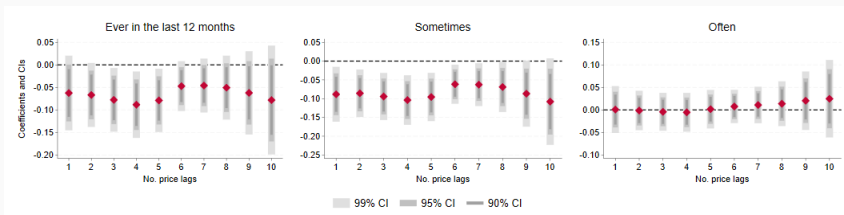
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Persistence of the Contemporaneous Effects on IPV: Detailed Categories

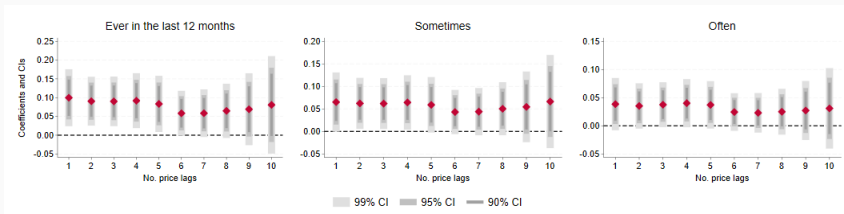
Main takeaway: [▶▶ Back](#)

- Decrease in the two types of IPVs persists, but vanishes in the long term
- Effects on IPVs that happens sometimes last relatively longer [▶▶ Details](#)

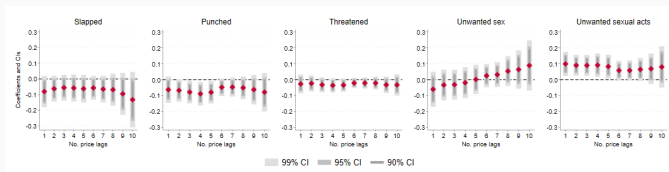
(a) Less severe physical IPV: Punch with first or hit by something harmful



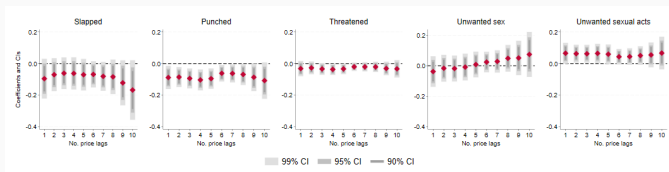
(b) Sexual IPV: Forced into other unwanted sexual acts



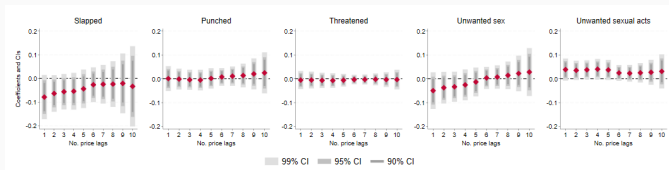
(a) Ever in the last 12 months



(b) Sometimes



(c) Often



Robustness of IPV Effects (broad): Gold Suitability Dummy

	Dependent variable: A dummy variable for intimate partner violence (IPV)			
	(1)	(2)	(3)	(4)
	Overall IPV	Less severe physical IPV	Severe physical IPV	Sexual IPV
Panel A. Ever in the last 12 months				
Gold suitable dummy \times Gold price	-0.114*** (0.028)	-0.097*** (0.031)	0.017 (0.025)	-0.040 (0.030)
Observations	69990	69987	69979	69972
R^2	0.18	0.17	0.12	0.13
Panel B. Sometimes				
Gold suitable dummy \times Gold price	-0.094*** (0.032)	-0.097*** (0.034)	0.009 (0.023)	-0.022 (0.024)
Observations	69813	68275	69478	68665
R^2	0.21	0.17	0.14	0.12
Panel C. Often				
Gold suitable dummy \times Gold price	-0.028 (0.022)	-0.021 (0.019)	0.006 (0.013)	-0.033 (0.022)
Observations	69840	67703	69250	67516
R^2	0.20	0.21	0.09	0.11

Robustness of IPV Effects (detailed): Gold Suitability Dummy

	Dependent variable: A dummy variable for intimate partner violence (IPV)									
	Less severe physical IPV				Severe physical IPV			Sexual IPV		
	(1) Pushed, shook, or had something thrown	(2) Slapped	(3) Punch with fist or hit by something harmful	(4) Had arm twisted or hair pulled	(5) Kicked or dragged	(6) Strangled or burnt	(7) Threatened with knife/gun or other weapons	(8) Physically forced into unwanted sex	(9) Forced into other unwanted sexual acts	(10) Physically forced to perform sexual acts respondent did not want
Panel A. Ever in the last 12 months										
Gold suitable dummy \times Gold price	0.004 (0.025)	-0.106*** (0.031)	-0.006 (0.023)	0.076* (0.044)	0.003 (0.025)	0.021* (0.013)	0.001 (0.014)	-0.036 (0.029)	0.039* (0.020)	-0.011 (0.029)
Observations	69952	69959	69921	63488	68212	69943	64505	69947	66091	53538
R ²	0.10	0.15	0.09	0.08	0.13	0.12	0.07	0.12	0.10	0.09
Panel B. Sometimes										
Gold suitable dummy \times Gold price	-0.022 (0.024)	-0.124*** (0.038)	-0.025 (0.019)	0.033 (0.039)	-0.007 (0.024)	0.011 (0.011)	-0.007 (0.011)	-0.018 (0.024)	0.029* (0.017)	-0.024 (0.025)
Observations	64635	61680	65880	60819	64500	68626	63516	64561	64004	51865
R ²	0.10	0.16	0.09	0.07	0.15	0.13	0.05	0.12	0.09	0.08
Panel C. Often										
Gold suitable dummy \times Gold price	0.010 (0.016)	-0.087*** (0.028)	0.006 (0.016)	0.041** (0.019)	-0.002 (0.016)	0.009 (0.008)	0.004 (0.010)	-0.040* (0.023)	0.004 (0.013)	-0.002 (0.014)
Observations	56547	43102	60325	56533	57675	66445	62618	57266	61709	49578
R ²	0.15	0.23	0.13	0.09	0.10	0.06	0.08	0.12	0.08	0.10

Robustness of IPV Effects (broad): Alternative Gold Prices

	Dependent variable: A dummy variable for intimate partner violence (IPV)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Overall IPV		Less severe IPV		Severe IPV		Sexual IPV	
Panel A. Ever in the last 12 months								
Gold suitable \times Log price	-0.072** (0.028)		-0.067** (0.028)		-0.015 (0.026)		-0.026 (0.035)	
Gold suitable \times Current price		-0.111** (0.048)		-0.117** (0.049)		-0.006 (0.045)		-0.024 (0.059)
Observations	69990	69990	69987	69987	69979	69979	69972	69972
R ²	0.18	0.18	0.17	0.17	0.12	0.12	0.13	0.13
Panel B. Sometimes								
Gold suitable \times Log price	-0.079** (0.032)		-0.070** (0.032)		-0.038 (0.023)		-0.010 (0.029)	
Gold suitable \times Current price		-0.099* (0.054)		-0.101* (0.055)		-0.042 (0.041)		0.001 (0.049)
Observations	69813	69813	68275	68275	69478	69478	68665	68665
R ²	0.21	0.21	0.17	0.17	0.14	0.14	0.12	0.12
Panel C. Often								
Gold suitable \times Log price	-0.008 (0.022)		-0.013 (0.019)		0.009 (0.014)		-0.018 (0.024)	
Gold suitable \times Current price		-0.026 (0.039)		-0.033 (0.033)		0.017 (0.025)		-0.024 (0.041)
Observations	69840	69840	67703	67703	69250	69250	67516	67516
R ²	0.20	0.20	0.21	0.21	0.09	0.09	0.11	0.11

Robustness of IPV Effects (detailed): Log Prices

	Dependent variable: A dummy variable for intimate partner violence (IPV)									
	Less severe physical IPV				Severe physical IPV			Sexual IPV		
	(1) Pushed, shook, or had something thrown	(2) Slapped	(3) Punch with fist or hit by something harmful	(4) Had arm twisted or hair pulled	(5) Kicked or dragged	(6) Strangled or burnt	(7) Threatened with knife/gun or other weapons	(8) Physically forced into unwanted sex	(9) Forced into other unwanted sexual acts	(10) Physically forced to perform sexual acts respondent did not want
Panel A. Ever in the last 12 months										
Gold suitable \times Log price	-0.005 (0.026)	-0.057** (0.028)	-0.049* (0.026)	0.016 (0.043)	-0.011 (0.026)	-0.006 (0.014)	-0.020 (0.017)	-0.040 (0.033)	0.079*** (0.022)	-0.029 (0.034)
Observations	69952	69959	69921	63488	68212	69943	64505	69947	66091	53538
R ²	0.10	0.15	0.09	0.08	0.13	0.12	0.07	0.12	0.10	0.09
Panel B. Sometimes										
Gold suitable \times Log price	-0.034 (0.025)	-0.065* (0.037)	-0.069*** (0.022)	-0.006 (0.039)	-0.025 (0.024)	-0.011 (0.012)	-0.024* (0.013)	-0.019 (0.029)	0.051*** (0.019)	-0.043 (0.029)
Observations	64635	61680	65880	60819	64500	68626	63516	64561	64004	51865
R ²	0.10	0.16	0.09	0.07	0.15	0.13	0.05	0.12	0.09	0.08
Panel C. Often										
Gold suitable \times Log price	0.010 (0.017)	-0.064** (0.026)	-0.003 (0.017)	0.023 (0.018)	0.004 (0.017)	0.001 (0.008)	-0.004 (0.012)	-0.038 (0.026)	0.032** (0.014)	0.004 (0.018)
Observations	56547	43102	60325	56533	57675	66445	62618	57266	61709	49578
R ²	0.15	0.23	0.13	0.09	0.10	0.06	0.08	0.12	0.08	0.10

Robustness of IPV Effects (detailed): Current Prices

	Dependent variable: A dummy variable for intimate partner violence (IPV)									
	Less severe physical IPV				Severe physical IPV			Sexual IPV		
	(1) Pushed, shook, or had something thrown	(2) Slapped	(3) Punch with fist or hit by something harmful	(4) Had arm twisted or hair pulled	(5) Kicked or dragged	(6) Strangled or burnt	(7) Threatened with knife/gun or other weapons	(8) Physically forced into unwanted sex	(9) Forced into other unwanted sexual acts	(10) Physically forced to perform sexual acts respondent did not want
Panel A. Ever in the last 12 months										
Gold suitable × Current price	-0.001 (0.045)	-0.088* (0.049)	-0.065 (0.044)	0.060 (0.075)	-0.002 (0.046)	0.002 (0.026)	-0.030 (0.029)	-0.053 (0.056)	0.147*** (0.039)	-0.023 (0.057)
Observations	69952	69959	69921	63488	68212	69943	64505	69947	66091	53538
R ²	0.10	0.15	0.09	0.08	0.13	0.12	0.07	0.12	0.10	0.09
Panel B. Sometimes										
Gold suitable × Current price	-0.044 (0.044)	-0.091 (0.063)	-0.095** (0.038)	0.038 (0.069)	-0.026 (0.043)	-0.012 (0.021)	-0.038* (0.022)	-0.016 (0.049)	0.098*** (0.034)	-0.044 (0.051)
Observations	64635	61680	65880	60819	64500	68626	63516	64561	64004	51865
R ²	0.10	0.16	0.09	0.07	0.15	0.13	0.05	0.12	0.09	0.08
Panel C. Often										
Gold suitable × Current price	0.012 (0.030)	-0.118** (0.046)	-0.007 (0.030)	0.031 (0.031)	0.005 (0.029)	0.007 (0.014)	-0.004 (0.022)	-0.058 (0.044)	0.057** (0.026)	0.009 (0.031)
Observations	56547	43102	60325	56533	57675	66445	62618	57266	61709	49578
R ²	0.15	0.23	0.13	0.09	0.10	0.06	0.08	0.12	0.08	0.10

Robustness of IPV Effects (broad): Industrial Mineral Mining

	Dependent variable: A dummy variable for intimate partner violence (IPV)			
	(1) Overall IPV	(2) Less severe physical IPV	(3) Severe physical IPV	(4) Sexual IPV
Panel A. Ever in the last 12 months				
Gold suitable \times Gold price	-0.109*** (0.039)	-0.095** (0.039)	-0.027 (0.034)	-0.045 (0.045)
Industrial mining \times Mineral price	0.133*** (0.051)	0.167*** (0.057)	0.090 (0.056)	0.079 (0.061)
Observations	70276	70273	70265	70258
R^2	0.18	0.17	0.13	0.13
Panel B. Sometimes				
Gold suitable \times Gold price	-0.119*** (0.043)	-0.100** (0.043)	-0.054* (0.031)	-0.028 (0.039)
Industrial mining \times Mineral price	0.161*** (0.060)	0.177*** (0.063)	0.121** (0.055)	0.066 (0.049)
Observations	70099	68552	69762	68950
R^2	0.21	0.17	0.14	0.12
Panel C. Often				
Gold suitable \times Gold price	-0.010 (0.029)	-0.012 (0.025)	0.010 (0.018)	-0.023 (0.028)
Industrial mining \times Mineral price	-0.056 (0.049)	-0.049 (0.048)	-0.034 (0.033)	0.015 (0.037)
Observations	70121	67973	69528	67791
R^2	0.20	0.21	0.09	0.11

Robustness of IPV Effects (detailed): Industrial Mineral Mining

	Dependent variable: A dummy variable for intimate partner violence (IPV)									
	Less severe physical IPV				Severe physical IPV			Sexual IPV		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Pushed, shock, or had something thrown	Slapped	Punch with fist or hit by something harmful	Had arm twisted or hair pulled	Kicked or dragged	Strangled or burnt	Threatened with knife/gun or other weapons	Physically forced into unwanted sex	Forced into other unwanted sexual acts	Physically forced to perform sexual acts respondent did not want
Panel A. Ever in the last 12 months										
Gold suitable × Gold price	-0.004 (0.034)	-0.081** (0.039)	-0.064** (0.032)	0.024 (0.051)	-0.014 (0.032)	-0.010 (0.020)	-0.025 (0.023)	-0.057 (0.043)	0.097*** (0.029)	-0.037 (0.041)
Industrial mining × Mineral price	0.053 (0.056)	0.148*** (0.055)	0.068 (0.041)	0.145 (0.091)	0.131* (0.073)	0.024 (0.043)	0.012 (0.037)	0.099 (0.062)	0.081* (0.044)	0.169*** (0.065)
Observations	70237	70245	70206	63768	68498	70228	64756	70233	66371	53775
R ²	0.10	0.15	0.09	0.08	0.13	0.12	0.07	0.12	0.10	0.09
Panel B. Sometimes										
Gold suitable × Gold price	-0.043 (0.033)	-0.096** (0.049)	-0.088*** (0.028)	-0.004 (0.046)	-0.032 (0.030)	-0.016 (0.016)	-0.031 (0.019)	-0.034 (0.039)	0.064** (0.025)	-0.052 (0.035)
Industrial mining × Mineral price	0.033 (0.049)	0.151** (0.063)	0.030 (0.036)	0.157** (0.080)	0.181*** (0.064)	0.012 (0.038)	0.029 (0.029)	0.100* (0.054)	0.046 (0.034)	0.095 (0.059)
Observations	64899	61941	66148	61082	64765	68906	63766	64838	64281	52098
Panel C. Often										
Gold suitable × Gold price	0.018 (0.021)	-0.077** (0.036)	0.001 (0.020)	0.031 (0.022)	0.005 (0.020)	0.001 (0.010)	-0.006 (0.015)	-0.050* (0.030)	0.037** (0.018)	0.005 (0.022)
Industrial mining × Mineral price	0.016 (0.038)	-0.043 (0.074)	0.008 (0.029)	0.009 (0.044)	-0.046 (0.054)	-0.003 (0.023)	-0.022 (0.025)	0.024 (0.039)	0.059* (0.032)	0.077** (0.039)
Observations	56766	43270	60573	56773	57908	66708	62858	57523	61972	49804

Robustness of IPV Effects (broad): Temp-Induced Push Factor

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	Dependent variable: A dummy variable for intimate partner violence (IPV)			
	(1) Overall IPV	(2) Less severe physical IPV	(3) Severe physical IPV	(4) Sexual IPV
Panel A. Ever in the last 12 months				
Temperature	-0.021 (0.037)	-0.069 (0.042)	-0.048 (0.033)	0.031 (0.041)
Gold suitable × Temperature	-0.023 (0.043)	0.050 (0.048)	-0.041 (0.040)	-0.028 (0.045)
Gold suitable × Gold price	-0.112*** (0.040)	-0.086** (0.041)	-0.030 (0.035)	-0.050 (0.045)
Observations	69990	69987	69979	69972
R ²	0.18	0.17	0.12	0.13
Panel B. Sometimes				
Temperature	-0.016 (0.042)	-0.048 (0.044)	-0.040 (0.028)	0.020 (0.036)
Gold suitable × Temperature	-0.070 (0.048)	-0.019 (0.050)	-0.035 (0.036)	-0.060 (0.039)
Gold suitable × Gold price	-0.131*** (0.044)	-0.103** (0.045)	-0.056* (0.032)	-0.039 (0.039)
Observations	69813	68275	69478	68665
R ²	0.21	0.17	0.14	0.12
Panel C. Often				
Temperature	-0.036 (0.028)	-0.038 (0.024)	-0.025 (0.016)	0.008 (0.023)
Gold suitable × Temperature	0.082** (0.036)	0.089*** (0.030)	0.008 (0.022)	0.035 (0.030)
Gold suitable × Gold price	0.003 (0.029)	0.003 (0.026)	0.011 (0.017)	-0.017 (0.027)
Observations	69840	67703	69250	67516
R ²	0.20	0.21	0.09	0.11

Robustness of IPV Effects (detailed): Temperature-Induced Push Factor

	Dependent variable: A dummy variable for intimate partner violence (IPV)									
	Less severe physical IPV				Severe physical IPV			Sexual IPV		
	(1) Pushed, shook, or had something thrown	(2) Slapped	(3) Punch with fist or hit by something harmful	(4) Had arm twisted or hair pulled	(5) Kicked or dragged	(6) Strangled or burnt	(7) Threatened with knife/gun or other weapons	(8) Physically forced into unwanted sex	(9) Forced into other unwanted sexual acts	(10) Physically forced to perform sexual acts respondent did not want
Panel A. Ever in the last 12 months										
Temperature	-0.026 (0.033)	-0.037 (0.042)	-0.084*** (0.030)	0.037 (0.030)	-0.051 (0.031)	-0.019 (0.016)	-0.007 (0.016)	0.003 (0.038)	0.012 (0.028)	0.070** (0.034)
Gold suitable × Temperature	0.068 (0.049)	-0.002 (0.045)	0.128*** (0.035)	-0.009 (0.044)	-0.008 (0.043)	-0.000 (0.022)	0.007 (0.023)	-0.002 (0.044)	-0.008 (0.032)	-0.025 (0.045)
Gold suitable × Gold price	0.005 (0.035)	-0.081** (0.041)	-0.043 (0.032)	0.022 (0.051)	-0.013 (0.033)	-0.010 (0.019)	-0.026 (0.023)	-0.060 (0.042)	0.099*** (0.030)	-0.045 (0.047)
Observations	69952	69959	69921	63488	68212	69943	64505	69947	66091	53538
Panel B. Sometimes										
Temperature	-0.027 (0.033)	-0.017 (0.044)	-0.056** (0.027)	0.034 (0.027)	-0.035 (0.027)	-0.020 (0.013)	-0.004 (0.014)	-0.010 (0.035)	-0.014 (0.025)	0.062** (0.031)
Gold suitable × Temperature	0.056 (0.043)	-0.045 (0.050)	0.098*** (0.031)	-0.029 (0.041)	-0.030 (0.038)	-0.003 (0.019)	0.000 (0.019)	-0.047 (0.039)	0.013 (0.027)	-0.041 (0.039)
Gold suitable × Gold price	-0.039 (0.034)	-0.101** (0.050)	-0.075*** (0.029)	-0.007 (0.047)	-0.033 (0.031)	-0.017 (0.016)	-0.032* (0.019)	-0.044 (0.039)	0.067*** (0.026)	-0.067* (0.040)
Observations	64635	61680	65880	60819	64500	68626	63516	64561	64004	51865
Panel C. Often										
Temperature	-0.008 (0.020)	-0.085** (0.034)	-0.043** (0.018)	-0.002 (0.015)	-0.030* (0.018)	-0.006 (0.009)	-0.003 (0.008)	-0.002 (0.026)	0.008 (0.014)	0.005 (0.015)
Gold suitable × Temperature	0.035 (0.029)	0.089** (0.042)	0.059*** (0.023)	0.012 (0.022)	0.015 (0.027)	0.007 (0.012)	0.006 (0.016)	0.051 (0.033)	-0.010 (0.020)	0.019 (0.027)
Gold suitable × Gold price	0.024 (0.021)	-0.058 (0.038)	0.010 (0.019)	0.029 (0.022)	0.006 (0.020)	0.002 (0.010)	-0.005 (0.014)	-0.042 (0.028)	0.037** (0.018)	0.012 (0.025)
Observations	56547	43102	60325	56533	57675	66445	62618	57266	61709	49578