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STATISTICS

# Using Online Resources in Compiling Residential Property Price Indices (RPPI) – Helping to Close the Data Gap

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The views expressed herein are those of the authors and should not be attributed to the IMF, its Executive Board, or its management

# Relevance of RPPIs

## Financial stability assessment of risk exposure

- Declines in property price indexes adversely affect
  - Financial sector
  - Financial situation of individuals/households
  - Credit rating, value of collateral, debt to equity ratios

## Macro and micro prudential supervision

- Market volatility and cyclicalities can impact on economic activity
- House price bubble affects debt, borrowing, consumption and investment
- Recessions deeper and of longer duration when accompanied by house price bubble bursting

## Informing monetary and taxation policy

## Decision making by households and investors

## Statistical Uses (national accounts - balance sheet and fixed capital formation)

# Stylized data needs

## Major needs

- Accurate transaction prices (or best proxy)
- Key property characteristics to control for different properties transacting in different periods
- Good coverage by geography and type (apartment, houses) including cash purchases, existing and new properties
- Timely and sustainable

Complete administrative data (registration or taxation) usually preferred; otherwise

- Bank data at loan level
- Asking prices from listings (Big Data)
- Survey Data

# RPPI: Property-mix adjusted index

Goal: A measure of pure price change

- Price determining characteristics include
  - Location (region, district, neighborhood)
  - Type (detached, semi-detached, apartment, villa)
  - Area of structure
  - Area of land
  - Age
  - Other

Other market insights also possible from online listings (rent offer price index, time to sell, % stock for sale)

# The web scraping tool

Approach : Use web scraping to retrieve available “Asking prices” and “Price determining characteristics” from websites listing real state properties

The tool works for websites in different languages

Step by step approach:

- List available websites with listing properties
- Understand the HTML structure of each website
- Implement customized scripts to retrieve data
- Save retrieved data in a structured format

# From listings to source data



House, 210 m<sup>2</sup>, 2nd floor, 6 ares \$ 140,000  
 Leninsky district, Rabochiy gorodok 10 940 650 s  
 I sell a new 2-storey house. Address Rabochy Gorodok, Gagarin / Nekrasov Street. The area of the house is 210 m2. The plot is...  
[Show phone](#)



House, 65 m<sup>2</sup>, 1st floor, 5 ares \$ 35,000  
 Leninsky district, Kirkomstrom 2 735 162 s  
 Abakanskaya street (wide, asphalted). Plot 5.5s (regular shape). House brick / adobe, 3k, kitchen (12m2) in the house of...  
[Show phone](#) AN



House, 113 m<sup>2</sup>, 1st floor, 7 ares \$ 55,000  
 Pervomaisky district, Western bus station 4 298 112 s  
 I sell a house on the street Karabaltinskaya (district West. Bus station). You can renovate and live, as well as for construction (the...  
[Show phone](#) AN

```

<div class="c-card c-card--wide">
  ...
  <div class="c-card_content h-hidden-desktop">
    <div class="c-card_price">
      <span class="c-card_price-used h-text-ellipsis">$ 140 000</span>
      <span class="c-card_price-kgs h-text-ellipsis">10 940 650 c</span>
      <div class="c-card_favorite js-favorite-icon" data-id="227475">
    </div>
  </div>
</div>
<div class="c-card_text h-text-ellipsis">
  Дом, 210 м<sup>2</sup>, 2 эт., 6 соток
</div>
<div class="c-card_location h-text-ellipsis">Ленинский район, Рабочий городок</div>
</div>
    
```

```

<div class="c-card-right_row">
  <h2 class="c-card-right_title h-text-ellipsis"><font style="vertical-align: inherit;"><font style="vertical-align: inherit;">
    House, 210 m<sup></sup></font></font><sup></sup><font style="vertical-align: inherit;"><font style="vertical-align: inherit;">2
    </font></font></sup><font style="vertical-align: inherit;"><font style="vertical-align: inherit;">, 6 аres
  </h2>
</div>
    
```

```

<p class="c-card-right_desc" style="display: -webkit-box; -webkit-line-clamp: 2;-webkit-box-orient: vertical;"><font
  style="vertical-align: inherit;"><font style="vertical-align: inherit;">I sell a new 2-storey house. </font><font
  style="vertical-align: inherit;">Address Rabochy Gorodok, Gagarin / Nekrasov Street. </font><font style="vertical-align: inherit;">The area of
  &#8203;&#8203;the house is 210 m2. </font><font style="vertical-align: inherit;">The plot is straight coal 6.2 ares. </font><font style="vertical-align: inherit;">The house is two bricks,
  they were building for themselves. </font><font style="vertical-align: inherit;">Paving stones, shed, lawns.
  </font><font style="vertical-align: inherit;">The house was put into operation, all documents are in order.
  </font><font style="vertical-align: inherit;">On the 1st floor there is a hall, a hall, an entrance hall, a kitchen
  and a bathroom. </font><font style="vertical-align: inherit;">On the 2nd floor there are 4 bedrooms and a bathroom.
  </font><font style="vertical-align: inherit;">Combined heating, 3-phase, warm floor. </font><font style="vertical-align: inherit;">Russian interroom doors. </font><font style="vertical-align: inherit;">All
  communications. </font><font style="vertical-align: inherit;">I'm asking $ 140,000, options are possible.
  </font><font style="vertical-align: inherit;">All questions by phone: 0555 510 610, 0703 922 772.</font></font></p>
<div class="c-card-right_bottom">
    
```

# Toolkit provides a structured dataset

Property	Num	sqr	flr	bldflr	X.Apartment.	Address	City	Price	Link
1-комнатная квартира, 37.94 м<U+00B2>	1	37.94	NA	NA	Apartment	Северноекольцо29	Алматы	12 069 663 <U+3012>	<a href="https://krisha.kz/a/show/56016203">https://krisha.kz/a/show/56016203</a>
2-комнатная квартира, 113.4 м<U+00B2>	2	113.4	NA	NA	Apartment	Медеуский-н,мкрГорныйГигант,Жамакаева254/2	Алматы	40 599 468 <U+3012>	<a href="https://krisha.kz/a/show/55898453">https://krisha.kz/a/show/55898453</a>
1-комнатная квартира, 66.8 м<U+00B2>	1	66.8	NA	NA	Apartment	Бостандыкский-н,Сыргабекова55	Алматы	46 092 000 <U+3012>	<a href="https://krisha.kz/a/show/52768340">https://krisha.kz/a/show/52768340</a>
1-комнатная квартира, 34 м<U+00B2>, 4/4	1	34	4	4	Apartment	Медеуский-н,ТУЛЕБАЕВА31—МАКАТАЕВА	Алматы	14 000 000 <U+3012>	<a href="https://krisha.kz/a/show/56560086">https://krisha.kz/a/show/56560086</a>
1-комнатная квартира, 46.39 м<U+00B2>	1	46.39	NA	NA	Apartment	Алматы-н,АхметаБайтурсынова—А62	Нур-Султан (Астана)	10 669 700 <U+3012>	<a href="https://krisha.kz/a/show/54510296">https://krisha.kz/a/show/54510296</a>
2-комнатная квартира, 46 м<U+00B2>, 5/5	2	46	5	5	Apartment	проспектАбая51—Республика	Нур-Султан (Астана)	12 300 000 <U+3012>	<a href="https://krisha.kz/a/show/56284736">https://krisha.kz/a/show/56284736</a>
2-комнатная квартира, 79.3 м<U+00B2>	2	79.3	NA	NA	Apartment	Медеуский-н,мкрГорныйГигант,Жамакаева254/2	Алматы	41 009 202 <U+3012>	<a href="https://krisha.kz/a/show/55898451">https://krisha.kz/a/show/55898451</a>
1-комнатная квартира, 48.2 м<U+00B2>	1	48.2	NA	NA	Apartment	Медеуский-н,мкрКоктобе,СагадатНурмагамбетова138/2	Алматы	28 300 000 <U+3012>	<a href="https://krisha.kz/a/show/51613650">https://krisha.kz/a/show/51613650</a>
1-комнатная квартира, 32 м<U+00B2>	1	32	NA	NA	Apartment	Турксибский-н,14-яулица38	Алматы	6 000 000 <U+3012>	<a href="https://krisha.kz/a/show/55258972">https://krisha.kz/a/show/55258972</a>
1-комнатная квартира, 42.8 м<U+00B2>	1	42.8	NA	NA	Apartment	Турксибский-н,мкрАльмерек,Гульдалинскийс/о,дом1160Дост	Алматы	9 416 000 <U+3012>	<a href="https://krisha.kz/a/show/53133591">https://krisha.kz/a/show/53133591</a>
3-комнатная квартира, 58.2 м<U+00B2>, 3/	3	58.2	3	5	Apartment	Аль-Фарабийский-н,Айбергенова	Шымкент	15 000 000 <U+3012>	<a href="https://krisha.kz/a/show/52240996">https://krisha.kz/a/show/52240996</a>
2-комнатная квартира, 43.5 м<U+00B2>, 4/	2	43.5	4	4	Apartment	Бостандыкский-н,Басенова29—Радостовца	Алматы	16 800 000 <U+3012>	<a href="https://krisha.kz/a/show/28178999">https://krisha.kz/a/show/28178999</a>
2-комнатная квартира, 63 м<U+00B2>, 7/9	2	63	7	9	Apartment	30-ймкр169	Актау	11 500 000 <U+3012>	<a href="https://krisha.kz/a/show/29564557">https://krisha.kz/a/show/29564557</a>
3-комнатная квартира, 105.1 м<U+00B2>	3	105.1	NA	NA	Apartment	Алмалинский-н,Наурызбайбатыра107/113—КурмангазыДост	Алматы	60 432 500 <U+3012>	<a href="https://krisha.kz/a/show/56358328">https://krisha.kz/a/show/56358328</a>
1-комнатная квартира, 25 м<U+00B2>	1	25	NA	NA	Apartment	Туркестан16—Орынбор	Нур-Султан (Астана)	18 300 000 <U+3012>	<a href="https://krisha.kz/a/show/55008269">https://krisha.kz/a/show/55008269</a>
2-комнатная квартира, 57 м<U+00B2>, 5/7	2	57	5	7	Apartment	Есиль-н,Мангеликел	Нур-Султан (Астана)	29 500 000 <U+3012>	<a href="https://krisha.kz/a/show/47020447">https://krisha.kz/a/show/47020447</a>
3-комнатная квартира, 78 м<U+00B2>, 3/7	3	78	3	7	Apartment	Лесозаводледовского	Павлодар	18 500 000 <U+3012>	<a href="https://krisha.kz/a/show/56220626">https://krisha.kz/a/show/56220626</a>
2-комнатная квартира, 67 м<U+00B2>	2	67	NA	NA	Apartment	Медеуский-н,мкрКоктобе,СагадатНурмагамбетова138/2	Алматы	39 700 000 <U+3012>	<a href="https://krisha.kz/a/show/51613673">https://krisha.kz/a/show/51613673</a>
2-комнатная квартира, 85.3 м<U+00B2>	2	85.3	NA	NA	Apartment	Медеуский-н,мкрГорныйГигант,Жамакаева254/2	Алматы	44 163 222 <U+3012>	<a href="https://krisha.kz/a/show/55898452">https://krisha.kz/a/show/55898452</a>
2-комнатная квартира, 84.83 м<U+00B2>	2	84.83	NA	NA	Apartment	БухарЖырау35ДоступновипотекуДоступновипотекуКвартиры,к	Алматы	40 319 699 <U+3012>	<a href="https://krisha.kz/a/show/56298935">https://krisha.kz/a/show/56298935</a>
2-комнатная квартира, 62.8 м<U+00B2>	2	62.8	NA	NA	Apartment	Турксибский-н,100-яулица542	Алматы	12 000 000 <U+3012>	<a href="https://krisha.kz/a/show/55884879">https://krisha.kz/a/show/55884879</a>
3-комнатная квартира, 57.7 м<U+00B2>	3	57.7	NA	NA	Apartment	Турксибский-н,мкрАльмерек,Гульдалинскийс/о,дом1160Дост	Алматы	13 500 000 <U+3012>	<a href="https://krisha.kz/a/show/55651681">https://krisha.kz/a/show/55651681</a>
3-комнатная квартира, 125 м<U+00B2>	3	125	NA	NA	Apartment	Думан-2ДоступновипотекуДоступновипотекуКвартиры,которм	Алматы	33 625 000 <U+3012>	<a href="https://krisha.kz/a/show/54870020">https://krisha.kz/a/show/54870020</a>
2-комнатная квартира, 65.5 м<U+00B2>	2	65.5	NA	NA	Apartment	Бостандыкский-н,Сыргабекова55	Алматы	45 195 000 <U+3012>	<a href="https://krisha.kz/a/show/52768427">https://krisha.kz/a/show/52768427</a>
3-комнатная квартира, 79 м<U+00B2>, 12/.	3	79	12	23	Apartment	Алматы-н,АхметаБайтурсынова12/1	Нур-Султан (Астана)	27 000 000 <U+3012>	<a href="https://krisha.kz/a/show/52381828">https://krisha.kz/a/show/52381828</a>
2-комнатная квартира, 63 м<U+00B2>, 5/4	2	63	5	12	Apartment	Алматы-н,АхметаБайтурсынова27	Нур-Султан (Астана)	15 800 000 <U+3012>	<a href="https://krisha.kz/a/show/56310691">https://krisha.kz/a/show/56310691</a>

# What to keep in mind

A good understanding of HTML structure

Web scraping depends on the structure of each website: scripts need to be customized

Websites structure might change through time: keeping the scripts up-to-date and checking structure on a regular basis

Some websites have mechanisms to stop machine generated requests: access can be blocked after a certain number of queries

It's advised to implement a checking mechanism to remove duplicates across websites and time

Formal data sharing may follow initial scraping...

# How IMF can help

Demonstrate how to build a toolkit

Potential short workshop if sufficient demand

Bilateral advice

Provide technical assistance on RPPI compilation to eligible countries

Contact us at: [STA-Analytics@imf.org](mailto:STA-Analytics@imf.org)